

FLORIDA HIGHWAYS

Published by the State Road Department

Vol. VI

No. 7

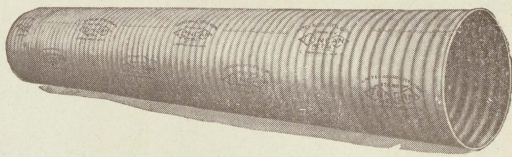


Proj. 40-A, Road 4, Brevard County, Showing the Indian River.

\$1.00 Per Year

Single Copies 10c

July, 1929

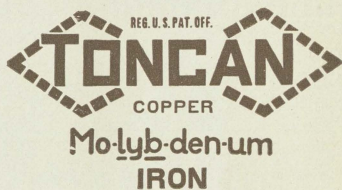


TONCAN COPPER MO-LYB-DEN-UM IRON

has been recognized by the leading contractors and highway builders all over the world as the most rust resisting culvert metal in existence.

Toncan corrugated iron culverts made of this super-metal insure many years of economical service. They are strong—they are tight—they are everlasting.

Write us today for prices and information.



THE BERGER MFG. CO.
Jacksonville, Fla.

Reinforcing Bars for Concrete

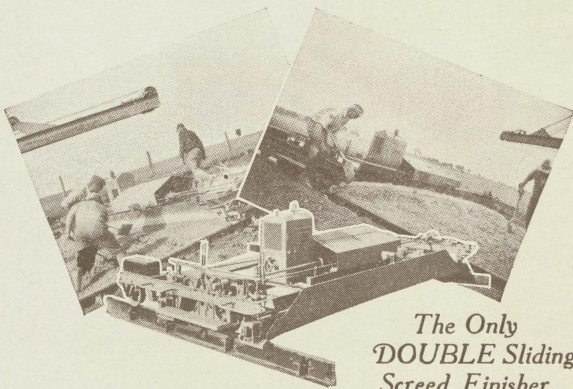
Made in the United States
from new billet steel.

Intelligent, dependable service
by expert bridgemen.

Dudley Bar Company

BIRMINGHAM, ALA.

Right on Top of the Mixer All the Time



*The Only
DOUBLE Sliding
Screed Finisher*

WHERE real records are being made in concrete road building, there you will find the **ORD Road Finishing Machine**, crowding the mixer no matter how many batches are being handled. And in addition to speed, there is a slab and surface quality that wins instant approval.

Write for New Bulletin.

A. W. French & Company
DIVISION OF BLAW-KNOX CO.

Manufacturers of the ORD Road Finishing Machine
8524 Vincennes Ave. Chicago, Ill.

REPRESENTATIVES

Contractors Equipment Co., 8 Riverside Viaduct,
Jacksonville

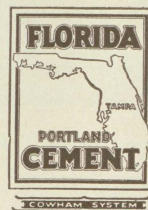
Coulter-Hart Equipment Co., 407 Eunice Avenue, Tampa

Florida Cement

EXCEEDS

State Highway Specifications

DAILY
CAPACITY



20000
SACKS

"A Florida Product for Florida Construction"

Florida Portland Cement Co.
Tampa, Florida

F L O R I D A

Vol. VI
No. 7



H I G H W A Y S

JULY
1929

Legislation Enacted at Regular Session of Legislature, 1929, Relating to State Roads

HOUSE BILLS

House Bill No. 185

Authorizes and directs Department to provide, within next twelve months, a serviceable road along the shore of Lake Okeechobee to close gap from Indian Prairie Canal to Kissimmee river. Makes said section of said road a permanent part of road designated as State Road No. 29.

House Bill No. 148

Authorizes and empowers State Road Department to take over and hard-surface that part of State Road No. 35 from town of Greenville to the Taylor County line, to intersect State Road No. 19 at Perry, and to accept bonds of Madison and Taylor county or proceeds therefrom. Work to begin when that

stage of construction has been reached on First and Second Preferential systems when labor and equipment may be transferred that will not delay their construction. (Or, in other words, a Third Preferential.) Recites that Madison county has \$7,000 per mile.

House Bill No. 186

Designates Road 67-A as follows: Commencing at a point on Road 67 at or near Main's Corner in Glades county, Florida, and extending west to La-Belle in Hendry county, Florida, via Citrus Center and Ortona in Glades county, along the most practical route.

House Bill No. 567

Designates as State Road No. a road extending from Canal Point by way of Pahokee to intersect

with State Road No. 25 at the town of Belle Glade in Palm Beach county; with all the rights and privileges as **designated** for State roads.

House Bill No. 652

Designates as a State road a road extending from Milton on State Road No. 1, thence northwesterly via Chumuckla Springs to Bogia on State Road No. 7; thence westerly to an intersection with State Road No. 87.

House Bill No. 767

Ocean Shore Boulevard from south boundary line of St. Johns county to the lighthouse at Ponce Park in Volusia county designated as State road; recites that same was constructed according to plans and specifications of State Road Department and at cost of \$1,800,000.00. Road to be numbered by State Road Department and Department authorized and empowered to immediately take over and maintain said road.

House Bill No. 886

Designates State Road No. 151 extending from Brighton in Highlands county south to the Indian Prairie canal in Glades county; thence in a southerly direction along a most practicable route over or near the present graded road to State Road No. 29 at Lake Port in Glades county, Florida.

House Bill No. 938

Authorizes and empowers State Road Department to maintain State Roads 21 and 57 in Volusia county.

House Bill No. 986

Designates as State Road No. 200 road beginning at point on State Road No. 28 at or near Keystone Heights, thence running north to Hampton; thence northwesterly from Hampton to intersect State Road No. 68 at or near the Leaston Wynn place, running via Hampton Beach; said road being otherwise known as Road No. 1 of Bradford county. Provides that road shall not be part of State First or Second Preferential. Road Department authorized to change number.

House Bill No. 1154

Designates State Road No. 26 as follows: extending from a point on State Road No. 8 near Lake Annie; thence by way of Moore Haven and Clewiston to a point on State Road No. 25 where it intersects the North New River Drainage canal, thence in a southeasterly course following the said North New River Drainage canal and the New river to Fort Lauderdale. Status of road not altered—simply defines more particularly the line and location.

House Bill No. 1055

Designates as a State road the following: extending from Raiford to Sanderson to intersect at a point three miles north of Bomanville with a road known as Road No. extending from Glen St. Mary to Taylor and Eddy, Florida. Not to be deemed in First or Second Preferential systems. Not numbered.

House Bill No. 1056

Designates as a State road the following: extending from Olustee, being a southwesterly direction, to Road No. 49 at Lake Butler, a distance of approximately 18 miles. Not to be deemed in First or Second Preferential highways systems.

House Bill No. 1091

Designates as a State road the following: connect-

ing with State Road No. 4 in Deerfield, Broward county, and running westerly and southerly and entering Miami on Northwest Seventh Avenue, locally known as West Dixie Highway. Department authorized to give proper numerical designation.

House Bill No. 1108

Designates as State Road the following: A road commencing at Campbellton, Florida, and running in an easterly direction through Sills and to connect with Road No. 90 at Malone in Jackson county, Florida.

House Bill No. 1039

Route line and location of State Road No. 26-A declared, designated and established as follows: Beginning at the city of Miami and proceeding along or in proximity to the Miami Drainage Canal to a point approximately south of where the North New River canal turns in an easterly direction, thence by two branches or arms, the one northerly to a point where same intersects road along North New River canal and the other along the general course of said Miami Drainage Canal to a point where same intersects Road No. 25. Status of road not altered, except to extent of altering line and location.

House Bill No. 1201

Designates as a State road the "Seville-Bunnell Road," beginning at Seville in Volusia county and running to Bunnell in Flagler county.

House Bill No. 1206

Extends State Road No. 19 to include State Road No. 45 running from Ocala in Marion county, through Astor in Lake county and Barberville in Volusia county, to a point in Volusia county where Volusia avenue of Daytona Beach intersects State Road No. 4. Not made a part of preferential system.

House Bill No. 1252

State Road No. 29, redesignated and re-established as follows: Beginning at a point on State Road No. 24 near Holopaw and extending south via Holopaw, Kenansville, Okeechobee, thence around the western shores of Lake Okeechobee to Moore Haven, also from Okeechobee to Jupiter via Sherman and Indiantown, connecting with State Road No. 4 at Jupiter.

House Bill No. 815

Designates as a State road a road branching off from State Road No. 10 in Walton county, east of LaFayette creek, and running thence to and across the mouth of Choctawhatchee river, thence by way of Point Washington in said county to the Gulf of Mexico.

Also designates as a State road a road leaving State Road No. 1 at or near Mossy Head in Walton county, Florida, running thence north across Shoal river at Turner Bridge, thence in a northerly direction and intersecting State Road No. 40 at Gordon in said county; to be numbered by Road Department, but not to have number higher than that of any other State road hereafter designated. Not in any preferential system.

House Bill No. 1058

Designates as State Road No. a road extending from Glen St. Mary to Taylor, Florida. Not to be deemed as part of First and Second Preferential systems.



Proj. 659, Road 3, Clay County.

House Bill No. 1144

Authorizes State Road Department to construct in connection with the construction of State Road No. 10 near St. Marks, Florida, that certain road extending four and one-half miles, more or less, to St. Marks, and to use and expend any available funds which it may have therefor, said extension to be a part of State Road No. 10 when constructed.

House Bill No. 342

Authorizes Board of Commissioners of State Institutions to co-operate with State Road Department in procuring the completion of adequate hard-surfaced roads traversing and connecting the State Prison Farm at Raiford with hard-surfaced Road No. 1 and hard-surfaced Road No. 13, and State Road Department authorized and directed to co-operate with Board of Commissioners of State Institutions for the purpose of carrying out Act, and to that end authorized to expend such moneys in carrying out Act as may be necessary for that purpose.

House Bill No. 491

Provides that concrete road 32 feet in width constructed by Duval county from city limits of South Jacksonville to the Atlantic ocean at Atlantic Beach, and the continuation of said road to and through Jacksonville Beach and the road from the southerly limits of Jacksonville Beach to the northerly limits of the City of St. Augustine in St. Johns county, be declared, designated and established as Road No. 78. That that part of road along Atlantic ocean in St. Johns county extending from Vilano Beach northwardly to the southerly limits of Jacksonville Beach, as now graded, shall be immediately paved and hard-surfaced by the State Road Department. That the paving and hard-surfacing of said State Road No.

78 in St. Johns county shall proceed forthwith and be first completed out of and from the proceeds and resources of the State Road Department available for the construction of roads.

House Bill No. 193

Declares, designates and establishes State Road No. 26-A as follows: Commencing at a point at or near Venus in Highlands county and extending south to the town of Everglade in Collier county, via Tasmania in Glades county, LaBelle and Felda in Hendry county, and Immokalee in Collier county, along the most practical route, and the Department is authorized and empowered to construct and maintain said road. Has Third Preferential provision, as follows: "Provided that the construction on the aforesaid road shall begin as soon as possible when that stage of construction has been reached on Roads 1 to 5, inclusive, and 8 and 19, 5-A, 10, 11, 13, 15, 20, 28 and 47 when labor and equipment may be transferred from the roads mentioned in this proviso that will not delay the construction of such roads mentioned in this proviso."

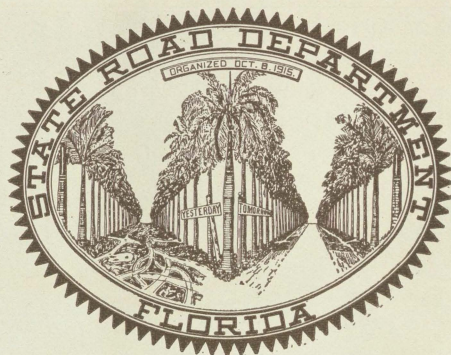
House Bill No. 583

Designates State Road No. 69 as a highway running from Live Oak in Suwannee county, thence extending in a southwesterly course through Suwannee county, Lafayette county and Taylor county to a point at or near the Gulf of Mexico at the mouth of the Steinhatchee river in Taylor county, via Luraville on the Suwannee river, Mayo, Cook's Hammock and Clara. Carries Third Preferential provision.

House Bill No. 595

Redesignates State Road No. 77 as follows: Commencing at a point on State Road No. 5-A between Branford and the Itchtucknee river and proceeding

(Continued on page 5.)



Florida Highways

Published Monthly
Official Publication of the State Road Department

PERSONNEL OF DEPARTMENT

ROBERT W. BENTLEY (*Bradenton*), *Chairman*
(*Official Residence, Tallahassee.*)

W. A. SHANDS, *Gainesville*

J. HARVEY BAYLISS, *Pensacola*

G. D. PERKINS, *Jacksonville*

ERNEST R. GRAHAM, *Pennsuco*

Members.

WALTER P. BEVIS, *Tallahassee, Secretary*

PERSONNEL OF EMPLOYEES IN GENERAL CHARGE OF THE WORK OF THE DEPARTMENT

Engineering Division

J. L. Cresap, Tallahassee.....State Highway Engineer

L. K. Cannon, Tallahassee...Ass't. State Highway Engineer

G. L. Derrick, Tallahassee.....Bridge Engineer

Harvey A. Hall, Gainesville.....Testing Engineer

F. W. Berry, Jr., Tallahassee.....Office Engineer

J. B. Trice, II, Gainesville.....Supt. of Equipment

R. L. Bannerman, Marianna.....1st Division

Counties—Bay, Calhoun, Escambia, Franklin, Gadsden, Gulf, Holmes, Jackson, Jefferson, Leon, Liberty, Okaloosa, Santa Rosa, Wakulla, Walton, Washington.

J. H. Dowling, Lake City.....2nd Division

Counties—Baker, Bradford, Clay, Columbia, Dixie, Duval, Hamilton, Lafayette, Madison, Nassau, St. Johns, Suwannee, Taylor, Union.

R. C. Fergus, West Palm Beach.....3rd Division

Counties—Brevard, Broward, Collier, Dade, Glades, Hendry, Indian River, Lee, Martin, Monroe, Okeechobee, Palm Beach, St. Lucie.

L. B. Thrasher, Ocala.....4th Division

Counties—Alachua, Citrus, Flagler, Gilchrist, Hernando, Lake, Levy, Marion, Orange, Putnam, Seminole, Sumter, Volusia.

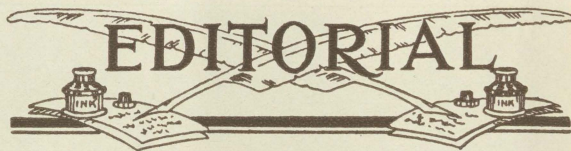
Henry Wilson, Lakeland.....5th Division

Counties—Charlotte, DeSoto, Hardee, Highlands, Hillsborough, Manatee, Osceola, Pasco, Pinellas, Polk, Sarasota.

Auditing Division

S. L. Walters, Tallahassee.....Auditor

B. A. Meginniss, Attorney for the Department,
Editor and Business Manager.



M. M. Smith

Early in the month we received the sad news of the death of Hon. M. M. Smith of Winter Park, former member and Chairman of the State Road Department. Mr. Smith, during his incumbency as member and Chairman endeared himself to his co-workers in the Department and his death, which was sudden, came as a great shock to his former associates.

While not the first to hold the designation of Chairman, that distinction having been held by Hon. Ed Scott of Arcadia, now also deceased, Mr. Smith was the first Chairman of the Department under the present law passed in 1919. That is to say, he was the first Chairman to reside at the seat of government and give full time to the duties of the Department as its executive. From 1915, when the Department was created, until 1919, when the present organization law became effective, one of the members was designated as Chairman of the Department, but continued to reside in his home city and to give only part time to the duties of the office.

Mr. Smith was one of the original good roads enthusiasts of Florida, and his keen interest in every phase of road construction and expansion continued throughout the years. FLORIDA HIGHWAYS shares in the sense of loss which is felt throughout the State in the death of Mr. Smith, and extends sincere sympathy to his family in their bereavement.

WIDER RIGHTS-OF-WAY FOR FLORIDA ROADS

It is interesting to note that at the last meeting of the Florida Highway Department the following resolution was passed:

"Be it Resolved, That from and after October 1st, 1929, it shall be the policy of this department to ask and secure rights-of-way for state roads of a width of not less than 100 feet."

This is certainly commendable and we sincerely hope that many other states will follow this example.

Michigan is acquiring rights of way from 100 feet to 400 feet in width, the latter applying especially to the Upper Peninsula where roads are laid through virgin forests and it is desirable to preserve this forest effect along our highways which is so much appreciated by the tourists.—Michigan Roads and Pavements.



Proj. 740, Road 10. Along the Gulf of Mexico in Gulf County.

LEGISLATION ENACTED, REGULAR SESSION, 1929, RELATING TO STATE ROADS

(Continued from page 3.)

southward across the Santa Fe river through the towns of Bell and Trenton, to a point on State Road No. 19, meeting State Roads 74 and 81 at Chiefland in Levy county. Carries Third Preferential system provision.

House Bill No. 633

State Road No. 66 extending from Tallahassee to a point on Road No. 20 at or near Youngstown, via Jackson Bluff, Bristol and Blountstown, be added to and made a part of State Road No. 19. Not given preferential status and carries Third Preferential provision.

House Bill No. 790

Designates as State Road No. 28-A road extending from State Highway 28 at Keystone Heights, to run thence southerly to Melrose. Carries Third Preferential provision.

House Bill No. 852

Designates State Road No. 72 as running from State Road No. 4 in the town of Bunnell and running in a northeasterly direction along the present highway known as the Moody Boulevard to a point in the town of Flagler Beach on the Atlantic ocean, where it intersects a highway known as the Ocean Shore Boulevard leading from St. Augustine in a southerly direction to Daytona Beach. Carries Third Preferential provision.

House Bill No. 885

Authorizes State Road Department to take over, build and construct State Roads 12, 58 and 76, but carries Third Preferential provision.

House Bill No. 936

State Road Department authorized and directed to

aid in early completion of State Road No. 39 as same passes through Washington county, by use of State convict labor in sufficient numbers to assure the early completion of said road through said county, if and when Special Road and Bridge District delivers to State Road Department the sum of \$100,000.00 to be expended in construction. Authorizes and directs State Road Department when \$100,000.00 is placed to its credit to build and construct the highway and bridges and culverts, but carries Third Preferential provision.

House Bill No. 1136

Designates and establishes State Road No. 92 as a highway running from a point on State Road No. 69 near Live Oak, thence extending on a westwardly course through Suwannee county and southwardly to a suitable point on Road No. 5-A in Lafayette county, said road to cross the Suwannee river at or near Dowling Park. Carries Third Preferential provision.

House Bill No. 1160

Authorizes State Road Department to take over, build, construct and maintain State Road No. 94 extending from Georgia state line at a point on Georgia State Road No. 1 and running easterly through Gadsden county via Concord to connect with Florida State Road No. 1 at Lake Jackson in Leon county. Carries Third Preferential system provision.

House Bill No. 1360

Requires State Road Department to take over for maintenance the Lem Turner road from Jacksonville city limits to a connection of State Road No. 4 in Nassau county. But maintenance to begin when that stage of construction on First and Second Preferential systems has been reached when labor and equipment may be transferred, etc.

House Bill No. 1400

Authorizes and empowers State Road Department to construct a connecting link between a point on State Road No. 15 at or near the Jefferson-Taylor county line to run in an easterly direction to connect with that certain Taylor county road which is now being built by said Taylor county from Perry and Hampton Springs towards the Jefferson county line. Carries Third Preferential system provision.

House Bill No. 1421

Authorizes State Road Department to pay its proportion of the cost of paving State Road No. 1 from McDuff street to Broad street in the city of Jacksonville, and to enter into such contracts with city of Jacksonville or contractors as may be necessary. Department's proportion defined to be the cost of an 18-foot concrete pavement of the kind and type generally used by the State Road Department. Carries Third Preferential system provision.

House Bill No. 1057

Designates as a State road Road No. extending from Lawt Conners Farm in a northeasterly direction to Moniac Bridge via Baxter, Florida (Baker county). Not to be deemed part of First or Second Preferential Highway system.

SENATE BILLS**Senate Bill No. 515**

Designates as a State road, a road beginning at a point on State Road No. 23, about two miles south of Zephyrhills in Pasco county, and thence run southeasterly along the route of the Atlantic Coast Line railroad to Thonotosassa in Hillsborough county, which said road the State Road Department is hereby authorized and empowered to take over for construction and maintenance; provided, that the construction on the aforesaid road shall begin as soon as possible when that stage of construction has been reached on Roads 1 to 5 inclusive, and 8 and 19, 5-A, 10, 11, 13, 15, 20, 28 and 47 when labor and equipment may be transferred from the roads mentioned in this proviso that will not delay the construction of such roads mentioned in this proviso.

Senate Bill No. 635

Establishes State Road No. 43 under the following description: Extending from a point on the Georgia line southerly through Micosukie to a point on Road No. 1 and over same easterly to a point north of Lloyd and thence southerly through Lloyd and Wacissa to the Gulf at or near the mouth of Pinhook river.

Senate Bill No. 376

Extends State Road No. 25 from its present eastern terminus at Military Trail in Palm Beach county, easterly following the line between Townships 43 and 44 to State Road No. 140 in Palm Beach county.

Senate Bill No. 408

Designates following as a State road: Running from a point at or near Dinsmore in Duval county and running thence northerly and westerly through the counties of Nassau, Baker and Columbia to a point on the Florida state line near St. George, where the same will connect with a state road now being constructed by the State of Georgia from Valdosta south by Fargo to the Florida line.

Senate Bill No. 418

Designates the following State road: No., extending from Lynn Haven Junction on Road 20,

running in a northerly direction to Lynn Haven, thence from Lynn Haven to Southport, across the North Bay bridge and thence from Southport to Chipley.

Senate Bill No. 431

Designates following State road: No., commencing at Greenwood, thence to Two Egg, Dellwood, Grand Ridge and to connect with road now constructed at Calhoun and Jackson county line, thence along said road to connect with Road No. 6 at Blountstown.

Senate Bill No. 571

Designates as State Road No. 81-A: Begin at a point on State Road No. 81, 230 feet southeasterly of Cow Creek in Levy county, and extend in a southeasterly direction to a point 10 feet southerly of Station 1159 on State Road No. 15 as located by the survey of said State Road No. 15 in Levy county by the State Road Department.

Senate Bill No. 649

Declares and designates as State Road No. 18-B that certain public road or highway in Manatee county as laid out and constructed from the city of Bradenton via Manatee and Waterbury to the intersection of State Road No. 18-A near Verna.

Senate Bill No. 255

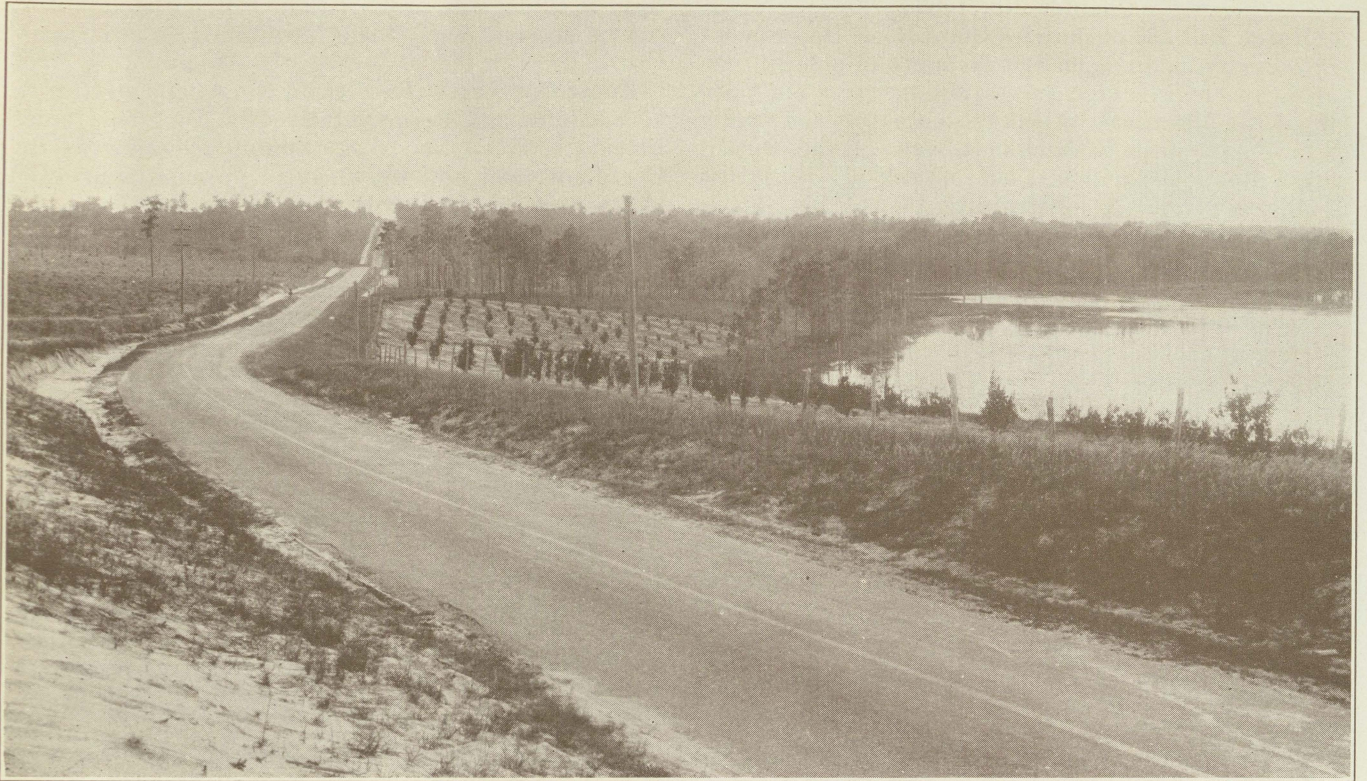
Recognizes and validates as an obligation of the State to pave as early as possible, "The contract made by the State Road Department with the County of Jefferson bearing date of November 14th, 1927, in pursuance of which State Road No. 11 in the County of Jefferson has been completed as a graded road, the entire cost thereof having been borne by said county on condition that the State will pave said road as early as possible." Provides that it shall be the duty of the State Road Department to put in its budget for 1930, among the first projects for that year, a pavement on the unpaved portions of said Road No. 11, and to construct the same accordingly; said pavement to be durable, substantial and efficient to carry heavy traffic and to be constructed with funds which may be provided by the State for highway construction and maintenance.

Senate Bill No. 709

Authorizes and directs State Road Department to construct and complete State Road No. 53 extending from Camp Walton along Santa Rosa Sound to Town Point and "said State Road Department shall make such annual appropriation in its annual budget as may be necessary to pay for the construction of said road in connection with moneys to be furnished by the counties through which it runs," but carries Third Preferential system provision.

Senate Bill No. 154

Designates as Road No. 142, the eastern terminus to be the intersection of Orange avenue in the city of Fort Pierce with line one and one-half miles south of the north line of township 35, or as nearly thereto as to be practical and economical to an intersection with State Road No. 29, thence as directly as is possible, practical and economical to the city of Sebring, securing a feasible and direct crossing of the Kissimmee river, all to be hereafter surveyed and located by the State Road Department and the location to be approved by the State Road Department, in accordance with the terms of above description, the intent of which is to describe a direct, practical route from Fort Pierce to Sebring.



Rock Base, Surface Treated, Road 2

Legislation Enacted at Extraordinary Session of Legislature, 1929, Relating to State Roads

Chapter No. 14557

House Bill 250 declares, designates and establishes a State road commencing on State Road No. 1 at Grand Ridge, Jackson county, extending from said point in a southerly direction to Blountstown, Calhoun county, to a connection with State Road No. 6; carries Third Preferential system provision.

Chapter No. 14558

Senate Bill 139 declares, designates and establishes as State Road No. a road extending from Ocala, Marion county, in a southwesterly direction to Hernando, Citrus county, via Stokes Ferry on the Withlacoochee river.

Chapter No. 14559

House Bill 240 directs State Road Department to locate that part of Road 23 in Hernando county, the route thereof to be from the northern county line of Hernando county, at or near Rerdel or Terrell in a southerly direction west of the Seaboard Air Line Railway company's track to the northern boundary line of Pasco county; carries Third Preferential system provision.

Chapter No. 14560

Senate Bill 42 authorizes and empowers State Road Department to construct and maintain State Road 52 and carries Third Preferential system provision.

Chapter No. 14561

Senate Bill 151 authorizes and directs State Road Department to construct and hardsurface with a pavement not less than 18 feet wide the road leading from the outer entrance of the Florida Hospital for the Indigent Insane at River Junction to the

railroad station in said town, at a cost not to exceed \$25,000.00.

Chapter No. 14562

Senate Bill 152 authorizes and directs State Road Department to construct and hardsurface with a pavement of not less than 18 feet in width the road leading from the Florida Industrial School for Boys, near Marianna, to connect with Road 1 at West Marianna, at a cost not to exceed \$25,000.00.

Chapter No. 14563

House Bill 63 declares, designates and establishes State Road No. 55 as a highway extending from a point at or near Pierson on Road No. 3 to Road No. 2 at Smithwick's Filling Station in Lake county, through Astor, Umatilla, Eustis, Tavares, Mineola and Clermont; authorizes State Road Department to take over and maintain that part of Road 55 in Lake county and carries Third Preferential system provision.

Chapter No. 14564

House Bill 138 declares, designates and establishes State Road No. 62 as a highway extending from Miligan, on State Road No. 1, by Baker and Munson, Berrydale and Jay to a point on State Road No. 7 at or near the Florida-Alabama state line; authorizes the State Road Department to take over said road for construction and maintenance, but carries Third Preferential system provision.

Chapter No. 14565

House Bill 221 authorizes and empowers State Road Department to construct and maintain State Road No. 90, but carries Third Preferential system provision.

Chapter No. 14566

House Bill 199 authorizes State Road Department to provide for the immediate repair and putting into operation of a bridge across Molino river on State Road No. 104, so as to make same usable for traffic as it existed prior to damage to same, and authorizes State Road Department, out of any monies in its hands available for expenditure, to provide for the expenditure for that purpose of not exceeding \$200,000; State Road Department is authorized to amend its budget to provide for said expenditure. Act is predicated on emergency, caused by the damage done to the bridge, but Act provides that the construction and repair of said bridge "shall begin as soon as possible when that stage of construction has been reached on Roads 1 to 5, inclusive, and 8, and 19, 5-A, 10, 11, 13, 15, 20, 28 and 47, when labor and equipment may be transferred from the roads

mentioned in this proviso that will not delay the construction of such roads mentioned in this proviso."

House Concurrent Resolution No. 4 calls attention of Senators and Representatives in Congress from Florida to Road No. 26-A, running from Venus to Everglade, and requests them to present to proper authorities the advisability of having said road included in the system of roads in Florida entitled to Federal aid as a military road or otherwise.

Senate Concurrent Resolution No. 4 requires State Highway Commission to place a suitable sign over the entrance at each end of the bridges spanning the Suwannee river on State Roads Nos. 1 and 19 when such roads have been constructed, containing the following words: "'Way Down Upon the Suwannee River'" and also the name of the author, "Stephen Foster."

Value Of Saving Highway Distance

Startling Figures Illustrating Great Present and Future Waste in Adding Unnecessary Mileage to Through Roads

By **JOHN T. LYNCH**, Asst. Locating Engineer
(In Kentucky Highways)

THE reader will perhaps be surprised when the statement is made that there would be justification for the expenditure of nearly \$400,000 to save one mile in the length of an important through road, such as the one now being built between Louisville and Cincinnati. It can be clearly shown that the elimination of one mile of distance on such a road would be worth this much to the public, when both taxpayers and road users are considered.

Some Traffic Figures

When this road is completed and paved for its entire length, the average daily traffic over it will undoubtedly exceed 1,000 automobiles per day. No accurate figures are available for the number of automobiles using the most heavily traveled roads in the State, such as the Louisville-Lexington road and the Lexington-Cincinnati road, but careful traffic estimates have been made for each of the toll bridges which the State Highway Department proposes to construct in the near future and these figures will give an idea of the amount of travel on some of the roads. Coverdale and Colpitts, consulting engineers, estimate the average daily traffic for the next ten years at several of these locations as follows:

U. S. Route No. 41 between Henderson, Ky., and Evansville, Ind.—3,550 vehicles.

U. S. Route No. 27 at Burnside—470 vehicles.

U. S. Route No. 60 near Paducah—450 vehicles.

U. S. Route No. 68 near Canton—230 vehicles.

Since taken over by the State Highway Department, the bridge at Munfordville, on U. S. Route No. 31, has carried an average of about 450 cars a day and the bridge between Lexington and Richmond, on U. S. Route No. 25, an average of about 620 cars a day. A good paved road connecting two large cities, such as Louisville and Cincinnati, should carry considerably more traffic than any of the bridges mentioned except the one on the Henderson-Evansville road and an estimate of 1,000 cars per day would seem to be conservative.

Saving to Taxpayers

Let us see what the saving of a mile of distance would be worth to the public on a road which is to be paved with concrete twenty feet wide, and which will carry an average of 1,000 cars a day. The saving would consist of two separate items: first, the saving to the taxpaying public and second, the saving to the traveling public.

The saving to the taxpayers would consist in the saving of the cost of constructing one mile of pavement, of the cost of maintaining this mile and of the cost of replacing it when it is worn out. The cost of grading and right-of-way might be more for the shorter or for the longer route, according to circumstances, and in any individual case, this would have to be taken into consideration after the saving in pavement cost for the shorter route was figured.

Concrete paving costs about \$2.50 per square yard, including engineering supervision, which, for a 20-foot pavement would amount to approximately \$30,000 per mile. The first item of saving to the taxpayers would therefore be \$30,000.

To maintain one mile of road of this type would cost about \$275 per year. As this is an expense occurring each year, the value of its elimination would be equal to the sum which would yield \$275 per year in interest. Assuming the interest rate to be five per cent, this sum would be \$5,500.

After about twenty years, the concrete pavement would be nearly worn out and it would not be economical to use it longer without rebuilding. The old concrete, however, could be used as a base for a new pavement and, if used in this way, would have a salvage value of about \$15,000 per mile. The cost of rebuilding the road would therefore be only \$15,000 per mile. This money would not have to be spent for twenty years and the present value of this saving would be equal to the sum which, if placed at compound interest, would amount to \$15,000 in twenty years. One dollar at five per cent compound interest for twenty years would amount to \$2.65,



Proj. 614, Road 5, Sarasota County.

so we should divide \$15,000 by \$2.65 to obtain the present value of this deferred cost. This gives about \$5,700.

We have, then, for the total saving to the tax payers, the following:

First cost, one mile of concrete paving	\$30,000
Maintenance = \$ 275 ÷ 0.05	5,500
Replacement = 15,000 ÷ 2.65	5,700

Total saving to taxpayers\$41,200

Saving to Road Users

To get at the value of the saving of one mile in distance to the road users, we must first see what it costs to drive the average automobile one extra mile. It costs about eight cents per mile to operate the average passenger automobile, but this includes a number of items of expense which would have to be incurred, regardless of the number of miles driven, such as license fee, storage, interest on investment, etc. Depreciation is partly due to changing models and partly due to the mileage driven. It would perhaps be fair to assume that about 75% of the depreciation is chargeable to the distance driven.

The U. S. Bureau of Public Roads has kept accurate cost data on one hundred and sixty-one passenger automobiles of eighteen different makes (in the low and medium price fields) and has published an itemized summary of the cost of operation up to December 31, 1928.

Considering only those items which are chargeable to the distance driven and assuming 75% of the depreciation to be chargeable to mileage, the average cost of operating these one hundred and sixty-one cars was as follows:

Gasoline	1.3 cents per mile
Oil and grease	0.4 " " "

Tires	0.5	"	"	"
Repairs	1.3	"	"	"
75% of depreciation	1.1	"	"	"
Total	4.6	"	"	"

The Engineering Experiment Station of Iowa State College has made a study of the cost of operating trucks, busses and passenger automobiles and figures published by them show that the cost of operating the average truck and bus is about 2.1 times the cost of operating the average passenger automobile. Multiplying 4.6 cents by 2.1, we have 9.7 cents per mile as the cost of operating the average truck and bus one extra mile. But this does not include the time of the driver, which should properly be considered, since trucks and busses are operated as commercial enterprises. Assuming that the average driver's time is worth fifty cents per hour, and that he drives at an average speed of twenty miles per hour, this item would amount to an additional 2.5 cents per mile. Adding this to the 9.7 cents, we have 12.2 cents as the cost of driving the average truck and bus one extra mile.

Of the 1 000 automobiles assumed, approximately 15% will be trucks and busses, so that the saving per day to the road users due to the elimination of one mile of distance will be as follows:

850 passenger automobiles at 4.6 cents =	\$39.10
150 trucks and busses at 12.2 cents =	18.30

Total daily saving to road users\$57.40

Multiplying this by 365, we find that the saving is approximately \$21,000 per year. An investment which would result in a saving to the public of 6% of its amount annually might reasonably be assumed to be a good public investment, so the saving of this

\$21,000 per year would justify an expenditure of \$350,000.

The total value to the public of saving one mile of distance, in an important through route, carrying 1,000 automobiles per day, would therefore be as follows:

Saving to the taxpayers	\$ 41,200
Saving to road users	350,000
Total saving to public	\$391,200

Less Heavily Traveled Roads

A similar computation has been made for a road of much less importance, to be paved with gravel, sixteen feet wide, and carrying an average of two hundred automobiles per day. Without burdening the reader by repeating the details of the calculation, the value to the public of saving one mile on such a road is about as follows:

Saving to taxpayers	\$12,000
Saving to road users	70,000

Total saving to public\$82,000

It can be seen from this that unnecessary mileage,

even on a road carrying relatively light traffic, is quite costly to the public.

Significance of the Figures

From the foregoing, it can be seen that the saving of distance on a road which is expected to carry 1,000 automobiles a day is worth about \$390,000 per mile to the public and on a road which is expected to carry two hundred automobiles a day, about \$82,000 per mile. It does not necessarily follow that the State should always spend proportionate amounts for grading and rights-of-way for the purpose of shortening distances. The limited size of the road fund and the immediate demand for roads in all sections of the State are factors which must be taken into consideration.

Furthermore, there are undoubtedly cases where the additional population served by the longer route is sufficiently great to justify the additional cost. However, the figures show very clearly how costly it is to the public to add unnecessary mileage to a through road, for the purpose of serving a relatively small local population, or for the purpose of saving a relatively small amount on the first construction cost.

Bureau Chief Writes Preface to New Book on Highway Problems

Latest Methods of Road Finance, Construction, and Administration Treated in New Booklet "Financial Problem," Says Author, "Is Fundamental and Difficult One to Solve."

A TIMELY publication involving an extensive study on the subject, "Highway Construction, Administration and Finance," is announced by the Highway Education Board.

It deals with the planning of a national highway system, with the various types of road suitable for differing traffic conditions, and with methods of financing such highway building. The studies are by E. W. James, chief of the division of design, United States Bureau of Public Roads, and now on leave in Colombia assisting that South American government in organizing a road-building program. The booklet is printed in Spanish, Portuguese and English.

"Poor roads," says Thomas H. MacDonald, chief of the United States Bureau of Public Roads, in an introduction, "cost more than do adequately serviceable roads. Roads built with honest administration and skilled technique have an earning capacity far beyond their cost. So the serviceable public highway has every right to be listed as an asset and not as an expense. It has already been well demonstrated that the highway can earn its upkeep, plus a very high profit on the investment.

"Road tolls collected in the form of motor vehicle license fees and gas taxes in the United States amount to a very large percentage of the annual highway bill, without excessive cost to the individual user. The very fact of relatively low taxes has encouraged the enormous use of the roads by so large a number of the public. This accounts for the high income from the roads in actual financial returns. It proves the value of good highways."

Recognizing that the financial problem involved in the highway program is in all countries "the

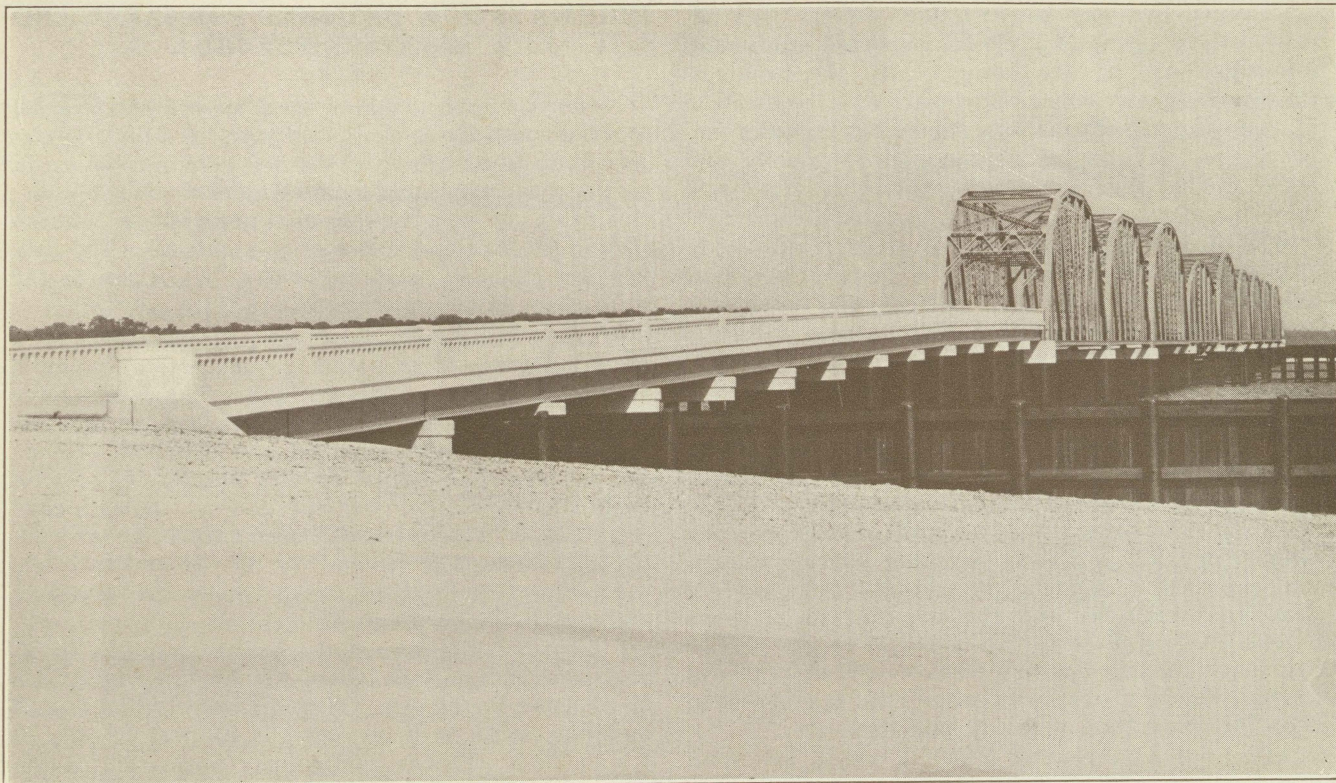
fundamental and difficult one to solve," Mr. James points out that, in order to keep expenditures to a minimum, three things must be attempted:

1. To select the right roads to be improved;
2. To determine the correct types to build at any time; and
3. To build progressively, but so that all work may be salvaged in future work.

The best method, he asserts, is "deliberately to plan a national highway system." It matters not, he adds, that pioneer roads and trails have developed, that some roads already have been improved, that cities have grown and the rural districts have been put under cultivation. Such study, he says, may disclose errors of the past and may lead to a change in location and priority of construction for many miles of highways, but if it does it saves money.

"Studies of highway systems made in the United States during the past three years," says Mr. James, "clearly demonstrate the value of such work even at a late date. But obviously the earlier in the highway history of a country such studies are made the greater good will flow from them."

The general character and condition of economic development, as revealed in data based on population, agricultural production in tonnage for general crops and in cost for special crops, such as dairy products delivered directly for consumption, and manufactured products by cost, must be surveyed, it is stated, in approaching a national or state highway plan. Other factors which must be considered include topography, existing traffic on the roads and the classification of this traffic, and the probable adequate mileage of roads in the system as a whole



Proj. 680. Approach to East Bay Bridge, Road 10, Bay County.

and in the several political or economic subdivisions thereof.

Emphasis is laid in the Highway Education Board's report on the importance of the progressive method of road building which, it is asserted, is "the only way possible to give service within any reasonable period to a state or nation which yet has most of its pioneer roads to improve."

As to financing it is declared that "roads should be built only to the extent and of such types as will pay for themselves." Every piece of construction, it is asserted, should be planned with an eye to the future and to the possibility, indeed to the probability, that a betterment of type will be required. Any highway expenditure to be justified must be earned by the road in the form of cheaper transportation, says the report, which argues that highways are fundamental requirements in a healthy, progressive, prosperous and ambitious nation.

Meaning What?

Minister's wives, as everybody knows, have a difficult lot in life, and a particular lady's lot so roused the sympathy of a friend that she remarked, "There ought to be a special place in heaven for minister's wives." "Perhaps you're right," responded the minister's wife, "but I should rather go with my husband."—The Christian Register.

All Agog

"How's the public sentiment out here?" asked the politician who was passing through a rural community.

"Still goin' strong," answered the native. "There was sixteen cars parked in my lane last night."—American Legion Monthly.

Manufacturing Good Roads

"THE manufacturing of good roads differs little in basic principles from any private manufacturing enterprise," declares Charles M. Upham, director of the American Road Builders' Association, who has recently returned from speaking on this subject in Cleveland, Chicago and other western cities.

"The wise expenditure of public funds depends entirely on whether these principles are followed or ignored," he adds. "It has been proven beyond question in many states that huge sums may be expended for highways, under business management, without waste, the investment bringing highly satisfactory returns in decreased transportation costs and generally increased prosperity. The expansion of this condition, country-wide, can best be accomplished by distribution of highway educational information. Without this knowledge, funds are wasted, expansion is restricted and highway industrial stagnation ensues."

The needs of the nation for highway development, Upham finds, call for greater activity in the industry and unceasing educational effort to awaken the people to highway needs and highway possibilities.

Among the needs cited are: high-speed by-pass arteries around large population centers; grade separations at intersections; elimination of "bottle necks"; addition of more exit and entrance roads to cities; widening programs, to a minimum of 40 feet in width in the vicinity of large cities; financing and development of the rural highways and "farm to market" roads; greater use of highway bonds for financing state and county road building programs.

"County highway construction, finance and administration presents a broad field for study and investigation," he declares. "Until the problems confronting many counties are solved by application of educational information, funds for highway improvement will be lacking and the neglected and much needed farm-to-market roads will be slow in materializing.

"There are 3,000,000 miles of rural highways in this country, 600,000 miles of which are improved to some extent. Less than half of this mileage is paved. This, in conjunction with 150,000 miles unimproved of the total 300,000 miles on the state systems presents a huge program for the road builder.

"Looking at the gas tax situation from the standpoint of car upkeep and per capita share of highway costs, the expense even at the maximum rate constitutes a very low road toll. The car owners in the two-cent tax states, based on tax income and the number of registered cars, pay \$9.63 average annual tax; the three-cent group pays \$13.85; the four-cent group pays \$21.34; and the five-cent group pays \$22.43. The average for all is \$15.09 per car owner per year. Most opposition to this form of road toll has developed in localities where the tax has been used for other than highway purposes.

"The toll amounts, at most, to about one-third of a cent per mile on the car which gets 15 miles to the gallon of gasoline and pays 5 cents for gas tax. Where the tax is lower, or the car mileage per gallon higher, the toll is correspondingly lower. In any case the toll is easily absorbed in lessened cost of upkeep of a car which is driven over improved roads.

"The highway constructed today is better and cheaper than that of a few years ago. Increased production and research have brought good results and this is only the beginning. That greater activity in highway research would react beneficially is unquestioned."

Can You Talk About Books with the Rest of Them? Picture yourself in a gathering of "up-to-the-minute" people. Someone mentions Trader Horn or H. L. Mencken. In a twinkling everybody is talking about these much-talked-of-writers. What do you do?—Herald Tribune adv. in the Nation.

We steal quietly out of the room.—The New Yorker.

HIGHWAYS NOW DESIGNED FOR SAFER AND SPEEDIER TRAVEL

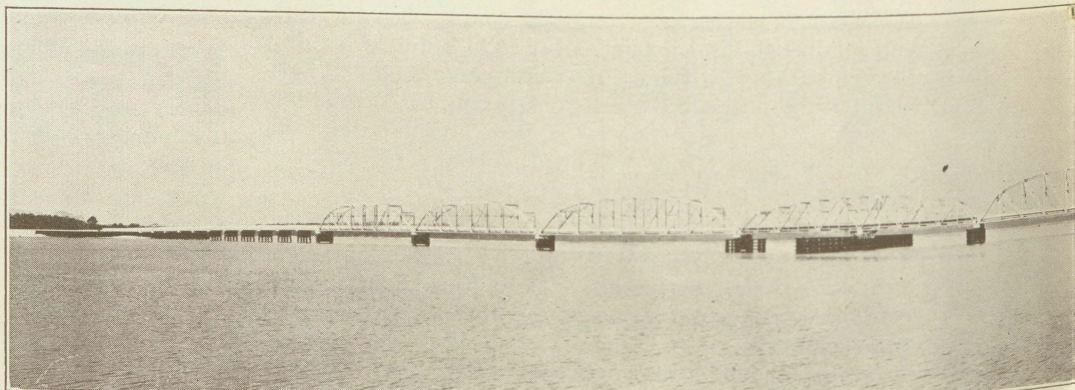
Newer designs in motor cars, busses, and trucks, together with the more liberal speed laws in the majority of States have presented new problems in highway construction for highway engineers to solve, according to the Bureau of Public Roads of the United States Department of Agriculture. The new vehicles demand that highways be designed for safer and speedier operation.

To meet this demand highway engineers today are planning roads with better grades and alignments than existed some 10 years ago. The roads have wider and smoother pavements and easier curves. The curves are superelevated and widened. Roads are developed to afford greater sight distances on both horizontal and vertical curves. Guard rails are more substantial and better protection at railway crossings is provided.

Further demands are made upon the highway engineer today by the dawning appreciation of natural beauty on the part of the general public. Highways must not only be travelable, but they must also be pleasing to the eye. The engineer develops road locations so as to bring out the natural beauty of the locality. This is particularly noticeable in the new road locations developed by the engineers of the Bureau of Public Roads in the national parks and national forests.

They are making use of short tunnels and half-tunnel sections under picturesque overhanging cliffs and along precipitous canyon walls. Formerly it was the custom to blast away these irreplaceable landmarks, destroying fine scenes and leaving ugly wounds which took years to heal.

Much can be done during the construction of highways to preserve and enhance their natural beauty, says the bureau, by intelligent clearing of the right-of-way so as to save desirable trees, by development of vistas of outstanding magnificence, and in building bridges and culverts to harmonize with the general character of the landscape. After the road is built much can be done by intelligent planting, with due care to avoid obstruction to view of intersecting roads, unnecessary interference with the cultivation of adjacent farm land, and use of plantings, foreign to the natural character of the locality.



Bridge Over East Bay, Road 10. Length of

The Universal Benefits of Highway Improvement

THE report of the Committee on Recent Economic Changes of the President's Conference on Unemployment, a committee of business leaders headed by Herbert Hoover, states that modern developments in industry and the methods of living of the people are the result of speed and spread rather than "profound economic changes." While the intense activity of the past decade has been "spotty," rayon manufacturers working at top speed while cotton manufacturers are on part time, for example, "the highway building programs throughout the nation were not limited to the intensively active areas; good roads were extended in all directions, serving the whole population."

This feature of the advantages of highway improvement in the welfare of the nation has been mentioned several times in this magazine but has not received the attention it deserves. Road building activity is independent of local or national business inflation or depression because the funds for such work are derived from taxation and, moreover, are used to employ men in factories making machinery and materials as well as the actual building or maintenance of the roads. As an employment safety valve which operates equally well under both good and bad general business conditions, road building and maintenance has not received its just due.

The importance of long-term programs on road with funds provided for over periods of five to ten years ahead cannot be too strongly emphasized. A state highway department is not merely a group of engineers collected to build a number of badly-needed highways and to be disbanded to reduce taxes but rather a group of planners for maintaining the even trend of general business conditions by providing a reservoir of employment in times of depression and reducing the costs of transportation by facilitating communication. To that end a long-term program of financing is essential and might well be considered by the "statesmen" in our legislatures.

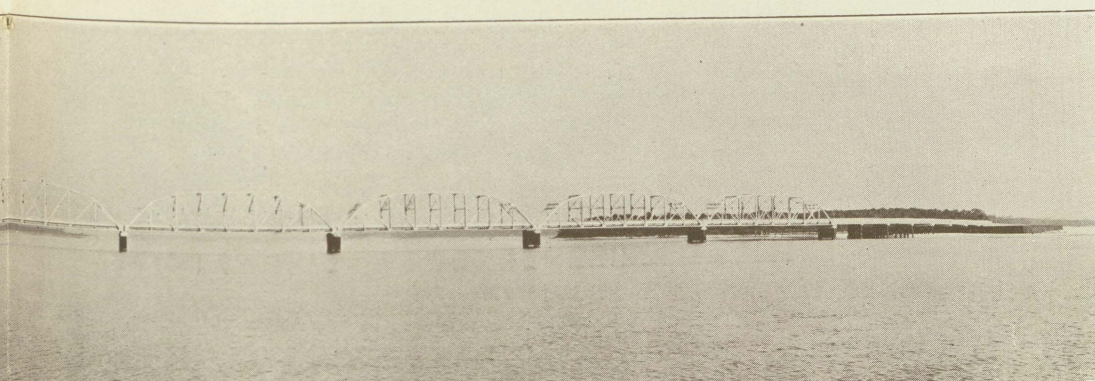
The budget system of planning highways over a two-year period and apportioning funds therefor

adopted by California is much to be commended. It is a policy far in advance of that adopted by many older states. But a much longer period planned ahead is desirable.

Not only are highways an important factor in the speeding up process in industry by facilitating the transport of agricultural and manufactured products but, as the report referred to further states, in the use of leisure, which is "consumable" only with the consuming of goods and services and therefore a business maker, "the domestic pilgrimage of some 40,000,000 motor tourists who use more than 2,000 tourist camps" must be considered. Daily the effectiveness of 25,000,000 motor vehicle owners is increased by the ability to get from place to place more rapidly and on Saturday afternoons and Sundays practically the whole Nation is awheel.

The more roads are used the more profitable they become from the standpoint of increasing the productivity per capita of labor which has increased nearly 60 percent in a period of 30 years. The increased productivity of farm labor has been accompanied by an increased use of the roads by farmers but this increase in use has by no means been in proportion to the increased use of roads by people other than farmers. There is no profit in building roads for people who do not use them and this, in a measure, may account for the failure to improve the secondary roads as rapidly as the main roads. But the improvement in the secondary or farm roads will accompany, undoubtedly, increased use by farmers. If the mileage of farm roads should be reduced it would be possible to proceed more rapidly with the improvement of such roads.

The universal benefits of highway improvement as affecting general prosperity need to be emphasized anew but with the reservation that each road should stand on its merits and if the road is constructed at a loss it should be carried on the books at its true value—and let the public know its true value. This is the surest way to eliminate buncombe from the road program.—Highway Engineer and Contractor.



of Bridge, 4,000 feet; Depth of Water, 40 feet.

The New Grand Canyon Bridge

By R. A. HOFFMAN, Bridge Engineer, Arizona Highway Department.

Editor's Note—This article describing the building of the new arch bridge spanning the Grand Canyon at Marble Gorge is of particular interest at this time. On June 14-15 occurred a formal dedication of the new structure and a public celebration which included the Governors of several neighboring states. More than 5,000 people were present.

The completion of this bridge is a noteworthy event, not only because of the difficulties met and conquered, but because it is the only crossing of the Colorado river for a distance of 600 miles. It makes possible the construction of a modern highway from Utah down into Arizona and New Mexico. A vast and marvelous country will be rendered accessible to the motorist—who is ever seeking new fields and scenes.

THE closing of the two great halves of the 616-ft. arch span bridging the Grand Canyon of the Colorado last fall may be said to have marked a milestone in the history of highway construction in Arizona. The placing of the pins at the center of the span, an event successfully accomplished in a few hours, was awaited with much anxiety by the engineers and contractors alike. Two hundred thousand dollars' worth of structural steel, representing many months of labor, hung as it were by a thread, as the giant jack screws lowered the steel onto the pins.

The completion of this project by the Arizona State Highway Department, opens a new route, a new land of scenic wonder to the tourist and citizens of the State. So much has already been said about the wonders of the country north of the Colorado in the states of Arizona and Utah that it would be useless to emphasize it further.

We look next to the strategic position of this bridge—the only one across the Colorado River in a stretch of approximately 600 miles—between the junction of the Green and Grand rivers, the beginning of the Colorado proper, and the bridge at Topoc, Arizona. When we consider that this is the only crossing between these points either by highway or railroad, we can visualize the extreme importance of this route, the only north and south route through Arizona connecting this state with Utah and points north. For this reason it is possible to predict the early completion of a modern highway through this section of the country.

The canyon, at this point the narrowest neck in the whole stretch of the gorge, is 585 feet from rim to rim with vertical wall to a depth of 450 feet below the rim. These walls are of solid Kaibab limestone, a very hard and durable rock, very suitable for the foundation of the type of bridge selected.

Location surveys and a visual inspection of the foundation indicated that a span of 600 feet would be adequate. Not entirely satisfied, however, it was requested that a party be sent out to make preliminary excavations to determine definitely the nature and extent of some of the fissures exposed on the surface. A small party under the direction of M. H. Hasler, then General Bridge Foreman for the Department, made sufficient excavation to determine the solid foundation. The expense incurred in this preliminary work was well worth while, for as a result of this work the span was increased to 616

feet and very little time was lost in making the design. Such a change later would have been costly.

The total length of the structure is 834 feet, consisting of a main deck arch span of 616 feet, two 84-foot pin connected deck spans on the Fredonia (north) side and one 50-foot of the same type on the Flagstaff side. The rise of the arch is 90 feet, the height from shoe pin to deck 130 feet, and the overall height of bridge about 115 feet. A reinforced concrete roadway 18 feet clear between curbs is provided for the entire length with concrete curbs on the approach spans and built up steel curbs on the arch to decrease the dead load.

Complete specifications and plans for the bridge, including stress sheets, general detail of the arch and approaches and the general details of the back ties down to the point of anchorage were prepared in the Bridge Department of the Arizona State Highway Commission under the direction of the writer.

On account of the 130-mile haul of material it was advisable to consider the structure as a whole including the tie back details as a means of using this otherwise waste material in the finished structure. Thus the approach spans were designed as pin connected deck spans and the anchorage or tie back eye-bars so designed as to be used for the tension chords and diagonals of these spans.

It is the intention to deal chiefly with the erection up to and including the closing of the arch. The excavation work in which about 14,000 cubic yards of rock was removed was started on the Fredonia (north) side on January 13th, 1927, and completed March 23rd, when the crew and equipment was moved to the south side. These moves were accompanied by difficulties in moving the compressor and other equipment across the Ferry and up over the "dug-way." It was almost impossible to work both sides at the same time without two independent crews and, therefore, all work of one class was completed on each side before moving to the other. The excavations for both sides were completed by November 19th, 1927, and work started on the concrete for the arch pedestals on the Flagstaff side.

The Flagstaff pedestals were poured up to within eight inches of the seat for the steel shoes by March 9th, 1928, and the crew moved to the Fredonia side. These pedestals were finished April 5th.

During the week ending March 13th, 1928, the Kansas City Structural Co. moved in a crew and started excavating for the tunnels and shafts for the Flagstaff anchorage. It was during this same week that the first car of steel and equipment arrived in Flagstaff and the sub-contractor on the haul hauled the first steel.

It may be stated that on this particular job the hauling was considered to be one of the most important features and the success of the entire job depended in a great measure upon the success of this contractor's work. A haul of 130 miles over a modern highway would have been an everyday occurrence, but here was a job which required much forethought and a thorough knowledge of the country. One hundred and thirty miles of road through sand

washes, up and down steep grades and over rolling and uneven roads—a fairly easy trip for a light car, but many who saw the road were skeptical.

The contractor wisely selected two trucks combining great power and flexibility, one a six-wheel truck of 12-ton capacity driving on the four rear wheels and the other a four-wheel truck of 5-ton capacity and of the same make. All were mounted on pneumatic tires with duals on all rear wheels. These trucks, with a two-wheel "dolly trailer," comprised the major equipment for the haul. Some of the steel sections for the bottom chord weighed approximately ten tons each and as much as eighteen and twenty tons were hauled with ease in one load on the six-wheel truck and trailer.

Fortunately very little rainy or bad weather was encountered, the only delay being a snow blockade for a few days in the pass just outside of Flagstaff.

Shipment of the cars of steel from Kansas City to Flagstaff was arranged so that the arrival was timed to fit the truck haul and in this way there was no delay or crowding at the transfer yard at Flagstaff.

The hauling of about 1,100 tons of structural steel was practically completed in four months, with the exception of the two bottom chords at the center, which will be mentioned later.

The huge steel shoes with the 15-inch diameter steel pins were set on the Flagstaff side on April 16th, 1928. The first two panels of the arch, the toggles and ties to the anchorage, were then placed and riveted. These were adjusted for line and elevation by jack screws set in the base of the shoe and the eight inches of grout poured on May 10th. Two weeks were allowed for the grout to cure before erection proceeded.

The eleventh panel, completing the Flagstaff side

of the main arch, was in place and riveted by June 15th. It was during this week that one of the steel workers lost his life—falling from the top chord of the bridge to the water 460 feet below. True to tradition, the other four workers of this crew quit after the death of their comrade and a new crew had to be secured. The other crews remained on the job and went to work again the next day.

At this point of the work the first half of the bridge was standing out over the river at a distance of 308 feet, a huge cantilever without support except at the back shoes and the tie back. On the end of this cantilever a tower was erected and a cable-way erected to the Fredonia side for transferring the steel and equipment to that side.

The shoes on the Fredonia side were set July 12th and grouted in place August 2nd, with two points of the arch in place.

During the time of setting these shoes and the tie backs it was discovered that one of the screws of the toggles (the last one to be assembled) did not work easily in the nuts. All the rest had been tried and found to work smoothly and easily. In trying to free the movement of this screw the threads were stripped and a new screw had to be ordered from Kansas City.

Work continued to the fifth panel; the new screw and assembly arrived and were placed August 18th.

The tenth panel of the north side was in place by August 31st and the final measurement was taken for the eleventh panel which was left in the shop for drilling the pin holes in order to allow for any corrections necessary.

It was considered advisable to add five-eighths of an inch to one chord and one and one-quarter inches to the other. The additional five-eighths inch on



Plain Cement Concrete, Federal Aid Road 4.

both sides was added after carefully checking the span across the top, although the question is raised here as to whether the means used, a chain and plumb line, for such heights and distances, is more accurate than the original triangulation survey; and this error, if such existed, of five-eighths inch in 616 feet was negligible even on a structure of this type.

These last two chords were shipped from Kansas City, September 1st, and were set and riveted by the evening of the 11th of September. On the morning of the 12th all was in readiness for the lowering of the two 308-foot cantilevers, together forming the great arch of 616 feet.

The lowering operation was much less of a task than had been anticipated. About five hours of the morning of the 12th were consumed in arranging lines. The toggle bars were spread with a six-inch diameter compression screw with shoulder threads having a pitch of one-fourth inch. The upper ends of these screws were designed with a 5-foot diameter sheave on which four or five turns of five-eighths inch cable were wrapped and attached to the drum of the hoisting engine through a set of rope blocks, thus exerting a tremendous pull on the circumference of the sheave.

The toggle bars, 11 feet 4 inches center to center of end pins, were arranged in the form of a parallelogram with the 6-inch screw in a vertical position on the short diagonal, the points of the long diagonal being connected to the top chord of the arch. The maximum stress in this chord during erection was 680,000 pounds tension, and the resulting compressive stress in the screw amounted to 208,000 pounds at the maximum extension or open position of the toggle at the time of starting the operation. The maximum open position of the toggle was seven feet and the minimum position two feet, allowing five feet for closing. The resulting maximum displacement of the top chord pin at the toggle was about twelve inches.

The screws on the Flagstaff end were started about 11:00 A. M., and that half of the arch lowered nine inches at the crown before starting the other (north) end. Some trouble was encountered in starting the screws on the north and they were not in operation until about 2:00 P. M., and this side was lowered to the same elevation at the crown as the Flagstaff side and from this point on all four screws were operated simultaneously, keeping the pin holes in perfect alignment and elevation at all times, until both sides were bearing on the pin at 5:30 P. M.

An interesting feature of the operation at this time was the fact that the contraction of the steel, due to the falling temperature at this hour of the day, was so rapid that it required continuous operation of the screws to keep the toggles from again taking the load off of the center pins. The operation was continued on three of the screws until nearly 9:00 P. M. in order to keep sufficient slack to allow for temperature.—New Mexico Highway Journal.

"Never Put Off—"

"A Boy Scout doesn't procrastinate."

"No," agreed the small wearer of khaki. "That's why I always do my good deed first thing in the morning and get the darned thing over with."—American Legion Monthly.

THE "FLORIDA BOUND" URGE

The following, which appeared in a recent issue of "The Manufacturers' Record," gives an indication of the continuous movement of motor tourists into the State. As the article points out, this is the record taken at but one of the many excellent "gateway" highway routes into Florida, and was taken during a supposedly "off month" for Florida-bound tourists:

FLORIDA ATTRACTS BIG NUMBERS OF MOTOR TOURISTS

During the month of May, 4,341 motor vehicles carried 12,397 passengers into Florida through one entrance-way into the State, where an accurate record is kept. This was the motor-vehicle count of tourists automobiles with out-of-town licenses south-bound over the Jacksonville St. Johns River bridge at Jacksonville. In addition there were the thousands of tourists who entered the State by way of other highways leading into the central and western sections, and numbers of out-of-state automobiles were shipped in by rail and water. Thus, it is apparent that motor tourist travel to Florida continues heavy.

The list by states of Florida motor tourists passing over the Jacksonville St. Johns River bridge is as follows for the month of May:

States	Cars	Passengers
Alabama	644	1,932
Arizona	5	14
Arkansas	10	29
California	30	99
Colorado	4	14
Connecticut	30	95
Delaware	8	19
Georgia	1,707	4,951
Idaho	1	1
Illinois	85	216
Indiana	66	161
Iowa	10	20
Kansas	4	9
Kentucky	51	123
Louisiana	63	163
Maine	11	46
Maryland	28	79
Massachusetts	74	166
Michigan	61	168
Minnesota	9	31
Mississippi	20	54
Missouri	36	100
Montana	6	15
Nebraska	5	13
New Hampshire	2	4
New Jersey	102	244
New Mexico	2	8
New York	224	549
North Carolina	122	638
Ohio	180	495
Oklahoma	9	28
Pennsylvania	170	416
Rhode Island	3	9
South Carolina	157	445
Tennessee	117	325
Texas	70	145
Vermont	1	3
Virginia	50	148
Washington	4	7
West Virginia	7	22
Wisconsin	21	52
Wyoming	2	6
Canada	7	18
Cuba	1	1
District of Columbia	122	316
Totals	4,341	12,397

—Manufacturers' Record.



Proj. 654, Road 4, Broward County

The Nation's Traffic Problem

"THE nation's traffic problem has come to a point where it shadows the daily lives of all our people," declares M. O. Eldridge, Assistant Traffic Director, Washington, D. C., "and the time to meet and solve the problem is now."

As chairman of the committee on traffic of the American Road Builders' Association, Eldridge has named sub-committees to study every phase of the traffic problem during this year. Their findings will be presented at the Association convention and road show in Atlantic City next January and made available for general use.

The collection of accident statistics and analysis of accidents will be in charge of a group headed by Burton W. Marsh, Pittsburgh, Pa., which will also study traffic flow maps and spot maps, the necessity for uniformity in state and city vehicle laws and the question of where and why parking should be restricted, or eliminated entirely.

All questions dealing with regional planning will be in charge of the group headed by Dr. J. Gordon McKay, Cleveland, O., a former Bureau of Public Roads official and highway expert. His committee will study which streets are to be designated as through streets, which for one-way traffic, which classes of streets should be paved, widened or zoned for special classes of traffic, relation of pavement, design and type to traffic volume and loads, weights and loads for different classes of vehicles and necessity for zoning.

Streets will be classed by type of traffic as quantitative; local or foreign; or qualitative; trucks, automobiles, busses and street cars.

The traffic signals and signs and street lighting

study is in charge of Wm. S. Canning, Philadelphia, Pa. When and where traffic control devices are needed will be based on volume of traffic, its character, variation and direction as to whether it warrants the use of warning signs, flashing beacons, boulevard stop signs, isolated traffic control, officer control or complete automatic signal installations.

The amount of street lighting called for by maximum volume of traffic on two lane or wider streets, one-way or both, with and without car tracks will be investigated, as will location and arrangement of traffic lights, desirable types of timing equipment, maps of signal installations at unusual intersections, three, five and six-way, sharp angle intersections and traffic circles with varying intersections.

The fourth sub-committee will study traffic law enforcement and drivers' licenses. The issuance of licenses by examination and driving test, suspension and cancellation for misdemeanors or felonies, and elimination of mental and physical defectives are objectives where progress made will be immediately reflected in greater safety of highways, reduction of traffic fatalities and accidents and facilitated movement of the nation's traffic.

"Consider," says Eldridge, "an added 1,360,000 motor vehicles registered in 1928 over the previous year, bringing the total of motor vehicles set loose on the highways and streets of America to 24,493,124. The opening months of this year have set a still faster pace of increased registration.

"If these cars were evenly distributed the full length and breadth of our highway system, through and secondary roads and all, there would be only eight cars to the mile or on surfaced roads 40 cars

to the mile, but such distribution is not within the possibility or practicability of attainment.

"Therefore traffic must be studied from every phase, rules formulated that will permit of great expansion of automobile usage during the next decade, and laws passed and enforced accordingly. It is a question not only of controlling traffic, but of aiding it, speeding it up and adapting it to the present accommodations until more and wider highways and streets may be built.

"Great strides in construction must be made, with every consideration of traffic demands consistent with public safety. Safety is a paramount factor of traffic, facility a secondary one."

DELEGATES TO ROAD CONGRESS NAMED

The American delegates to the Second Pan-American Congress of Highways to be held at Rio de Janeiro from Aug. 16 to 31, were announced recently by the State Department, having been appointed by the President. The commission will act as the official representatives of the Government, Congress having authorized the acceptance of the invitation by the Brazilian government and the appointment of the commission by the President. The appointees are:

J. Walter Drake of Detroit, former Assistant Secretary of Commerce; H. H. Rice, of Detroit, assistant to the president of the General Motors Corporation and chairman of the United States delegation to the first Pan-American Congress of Highways; Senator Tasker L. Oddie of Nevada; Representative Cyrenus Cole of Iowa; Thomas H. MacDonald, chief of the Bureau of Public Roads; Frank Sheets of Springfield, Ill., chief engineer of the Department of Public Works and Buildings; C. M. Babcock, commissioner of highways of Minnesota; Frederick A. Reimer, consulting engineer and president of the American Road Builders' Association.

J. Walter Drake was one of the founders of the Pan-American Confederation for Highway Education and a member of its committee. He is a member of the Automobile Chamber of Commerce.

Senator Oddie is a member of the Senate Post-office Committee and Mr. Cole is author of the resolution appropriating \$50,000 for a survey of the Pan-American Highways.

Mr. MacDonald was named as the technical member and economic adviser of the commission. He is a member of the executive committee of the Pan-American Confederation for Highway Education, represented this country at the Fifth International Road Congress at Milan in 1926, and was a member of the delegation to the First Pan-American Congress of Highways at Buenos Aires in 1925.

Mr. Sheets, former president of the American Association of State Highway Officials, who is in charge of one of the largest highway construction programs in the United States, and Mr. Babcock, one of the delegates to the first Pan-American Congress of Highways and a former president of the American Association of State Highway Officials, were appointed by President Hoover to represent the State highway departments.

Mr. Drake and Mr. Rice were appointed to represent industry.

Mr. Rice was chairman of the delegation to the Buenos Aires conference. He is a member of the Highway Education Board and Treasurer of the National Automobile Chamber of Commerce, as well as a recognized authority on highway finance.

The purpose of the Congress is to promote Pan-Americanism through the extension of good highways and other means of communication.

According to advices from the Brazilian capital, the plans for the congress are already well advanced under the direction of President Luis and the supervision of Mr. Timotheo Penteado, national director of highways, and Dr. Lima Campos, secretary of the organizing committee. Dr. Penteado and Dr. Campos were members of the first Pan-American Highway Commission which visited the United States in 1924 as guests of the Highway Education Board.—Michigan Roads and Pavements.

ONE-WAY TRAFFIC ON HIGHWAYS

Recently there have been suggestions from prominent automobile manufacturers that main roads subject to congestion be built so that one-way traffic rules could be put in effect.

The history of the railroads shows that safety was achieved largely through a double-tracking program and it is thought by those advocating one-way traffic that highways would have a similar record of safety achieved. One-way streets in cities have been found effective in many cases in reducing congestion on narrow streets and improving safety conditions.

As applied to highways, the plan for one-way traffic is essentially one of building parallel roads to those already in existence with the probable result that peak loads would occur at definite intervals and roads would be operating at much less than capacity most of the time.

The plan that is being followed for the most part by engineers at the present time is one of not separating traffic except by traffic lines which it is hoped that motorists will become educated to follow. In some cases, the mechanical difficulty of getting out of a traffic lane has been accentuated by making the traffic mark a foot or more wide of some different paving material such as asphalt on a concrete road or brick on an asphalt or concrete road.

It seems highly probable that the development of one-way traffic will progress as traffic becomes heavier but the cost of providing separate roadways on most of our highways is at present prohibitive with the funds available.

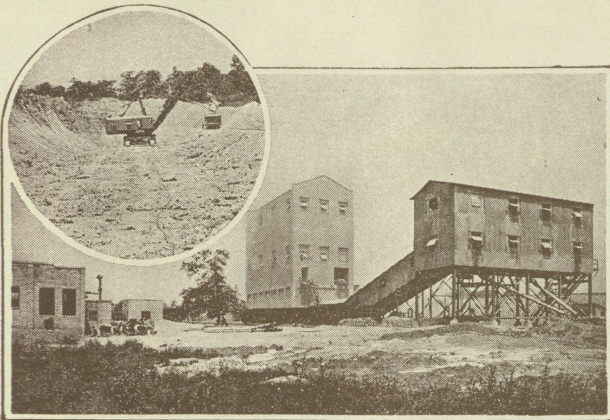
One-way traffic means new financing methods such as toll roads for those willing to pay.—Highway Engineer and Contractor.

Not So Dumb

The dull boy in the class unexpectedly distinguished himself in a recent examination when, in replying to the question, "How and where was slavery introduced into America?" he wrote:

"No women had come over to the early Virginia colony. The planters wanted wives to help with the work. In 1619 the London Co. sent over a shipload of girls. The planters gladly married them and slavery was introduced in America."—The Pathfinder.

Birmingham Slag Company's New Plant



THE Birmingham Slag Company has just completed a modern crushing and screening plant to take care of the blast furnaces recently installed by the T. C. I. & R. R. Co. at its Fairfield works.

The new plant, which is now in full operation, embodies a number of features that are new. The parallel loading tracks are so arranged that grades are favoring loads at all times. Above the plant there is storage space for 100 cars and facilities for handling an equal number below the plant have been provided. The parallel loading tracks are so ar-

anged that cars can be loaded on either track with equal facility.

The slag is reclaimed from modified pits (dry slag canals about 700 feet long) by electrically operated shovels and is carried to the crushing and screening plant in 40-yd. bottom dump cars, equipped with motors which obtain their power from a third rail.

The slag is then dumped at the crusher house over a live roll grizzly, the minus 1½ inch slag going direct to elevator, the oversize falling directly into a huge gyratory crusher. After the slag has been crushed it is elevated to the top of the screen house and discharged over a magnetic pulley to vibrating screens. These screens are so arranged that all slag larger than 1 inch can be diverted to a smaller crusher in the screen house and reduced to sizes less than 1 inch.

Under the screens are fourteen bins for storage of the various sizes. A 48-inch conveyor belt is installed under the bins. And the bin gates are so constructed that they can be automatically opened and closed by the operator in the loading house. This enables the operator to release onto the conveyor belt the exact quantity of each size to make any grading required.

The Fairfield plant is the fifth modern crushing and screening plant operated by the Birmingham Slag Co. It is electrically operated throughout and has a daily capacity of 2,000 tons.

Terrible! Terrible.

Inspecting the ranks of his company, the captain found one private standing stiffly at attention.

"Hey, you," he said, "you're at ease."

"I am not, sir," the recruit retorted snappily. "I never tease anybody."—American Legion Monthly.

Two friends dining at a downtown club were discussing the romance of a common acquaintance.

"Dorothy is very devoted to him, isn't she?" observed one.

"She's head over heels in love with him," was the rejoinder. "She's quit drinking, she's quit smoking, and she's quit swearing all for his sake."

Contracts Awarded by State Road Department January 1st, 1929, to July 17th, 1929

Proj.	Road	County	Contractor	Length Miles	Length Feet	Contract + 10%	Type
55	14	Alachua	L. M. Gray	16.77	.....	206,412.32	R. B. S. T.
624	50	Hamilton	Manly Const. Co.	6.23	.....	84,888.18	R. B. S. T.
858	4	Duval	F. S. Whitney	7.00	.....	68,438.10	Mac. Asph.
678	10	Bay	McVay Lindsay & Son	5.00	.....	9,295.00	Hauling
695	2	Lake	Manly Const. Co.	0.40	.....	5,380.54	R. B. S. T.
6	1	Madison	Duval Engr. & Contr. Co.	5.45	.....	91,560.17	R. B. S. T.
669-Y	27	Collier	Kerr and Lawrence	13.55	.....	99,705.56	Grading
854	60	Walton	G. W. Byrd	9.81	.....	85,160.28	Sand Clay
855	60	Walton	C. C. Moore Const. Co.	9.32	.....	90,311.26	Sand Clay
661	2	Lake	Manly Const. Co.	.14	.....	9,313.15	Sheet Asp.
767-688	10	Bay	H. W. Johnson	.....	75	2,567.88	Timber
40-B	4	Brevard	I. B. Purdy	.....	.....	10,565.72	Embankment
806-A	25	Hendry	R. C. Huffman Const. Co.	11.00	.....	32,594.05	C. G. & G.
806-C	25	Hendry	R. B. Stuart	11.00	.....	44,761.37	C. G. & G.
806-D	25	Hendry	R. C. Huffman Const. Co.	12.76	.....	62,950.91	C. G. & G.
62-B	24	Osceola	Florida Bridge & Const. Co.	.....	789	115,447.66	Conc. Bdg.
518	5-A	Lafayette	Broadbent Const. Co.	17.57	.....	244,783.73	R. B. S. T.
587-B	5-A	Columbia	Perkins & Lawson	.....	99	11,405.71	Conc. Bdg.
678	10	Bay	McVay Lindsay & Son	4.00	.....	13,860.00	Hauling
715	28	Union	L. M. Gray	5.26	.....	70,922.96	R. B. S. T.
716	28	Bradford	Duval Engr. & Contr. Co.	11.22	.....	157,799.23	R. B. S. T.
587	5-A	Columbia	Duval Engr. & Contr. Co.	4.43	.....	53,885.30	R. B. S. T.
718	5-A	Columbia	Duval Engr. & Contr. Co.	8.22	.....	101,724.95	R. B. S. T.
815	54	Okaloosa	G. W. Ryrd	12.50	.....	27,434.00	Sand Clay
717-706-A	28	Bradford-Clay	Manly Const. Co.	12.06	.....	173,340.83	R. B. S. T.
749-750	14	Gilchrist	L. B. McLeod Const. Co.	8.52	.....	100,722.27	R. B. S. T.
820	96	Jefferson	H. D. Spangler & Co.	9.38	.....	63,008.18	G. & D.
821	96	Jefferson	H. D. Spangler & Co.	5.13	.....	25,478.80	G. & D.
615	5	Sarasota	L. B. McLeod Const. Co.	1.20	.....	20,359.90	R. B. S. T.
	25	Palm Beach	Southern Asph. Const. Co.	4.00	.....	5,575.87	S. T.
Total				211.92	963	\$2,089,653.88	



F. A. Proj. 46, Road 3, Nassau County.

ONLY LIGHTED HIGHWAYS ARE SAFE

Automobile headlights do not afford safety to the pedestrian and he can walk on highways at night without danger only if he wears very light clothes or if the highway is illuminated, according to a series of experiments described in *The Literary Digest*.

It was found that in ordinary dark clothes a pedestrian was not visible to the motorist until the car was almost upon him. In a white suit the headlights picked him out in plenty of time.

"As it is out of the question to expect that everyone who is walking along the highway will dress in white, the only alternative is to properly light the roads," says the article. "It is not sufficient to depend upon automobile headlighting alone, according to this demonstration."

Well lighted highways in Florida would promote safety from every known angle and be the last word in making Florida highways the finest by day and night in the South. Lighted highways are coming. —R. J. H. in *Florida Engineer and Contractor*.

Strange Bedfellow

A young operator had a fine collection of East African trophies, and amongst them a splendid buffalo head.

"What a wonderful head!" said his intended bride who had come to visit his home. "How did you get that? Was he very savage?"

"I had a deuce of a time with that buffalo," replied the hunter. "Never had such a morning in my life. I shot it in my pajamas."

"Good heavens!" murmured the sweet young thing. "How did it get there?"

So's Your Ole Doc

A sensational murder case was nearing its close, and in rebuttal the prosecution had called a famous mental alienist.

"Now, doctor," demanded counsel for the defense, "how do you account for the fact that Dr. Gurk, who preceded you, testified the defendant is as crazy as a crazy quilt?"

The noted specialist considered. Then the obvious answer came.

"Why," he said, "why, he's crazy, too!"—*The American Legion Monthly*.

An Old Hand

The drill sergeant was putting a gang of rookies through their initial paces and they were pretty awful. He groaned in desperation as his eye swept the line of men standing in every position except one a soldier should stand in, and then he brightened. Down at the end was a man with whom not even Pershing could have found fault. He stood erect, he was beautifully groomed and as the non-com's eye met his, his hand flashed to his hat in a snappy salute.

"Gosh!" ejaculated the non-com. "For a rookie you certainly gave a swell salute. Where did you learn it?"

"That's nothing, sir," said the john respectfully. "I used to be an usher in a movie palace."—*The American Legion Monthly*.

Another thing Job never had to contend with was a disappearing drawstring in his pajama trousers. —*The Pathfinder*.

Many a man in love with a dimple makes the mistake of marrying the whole girl.—*Life*.

Status of Construction

THROUGH APRIL 30TH, 1929

Proj. No.	Contractor	Road No.	County	Total Length Miles	Clearing Miles	Grading Miles	Base Miles	Surface Miles	Type	Per cent Complete
6-A	Duval Engr. & Contr. Co.	1	Madison	5.56	-----	-----	5.56	0.00	S.T.R.B.	72.60
52	R. G. Lassiter & Co.	1	Escambia	10.00	-----	-----	-----	1.00	Concrete	9.00
55	L. M. Gray	14	Alachua	16.44	-----	-----	16.44	4.35	S.T.R.B.	85.00
56	Nelson Brothers	10	Leon	17.98	-----	-----	-----	17.98	Concrete	98.00
62-A	A. D. Weeks	24	Osceola	12.52	12.52	12.52	-----	-----	Graded	100.00
62-D	A. D. Weeks	24	Osceola	12.62	12.62	12.62	-----	-----	Graded	100.00
518	Broadbent Const. Co.	5-A	Lafayette	17.57	-----	-----	0.00	0.00	S.T.R.B.	0.00
587	Duval Engr. & Contr. Co.	5-A	Columbia	4.43	-----	-----	0.00	0.00	S.T.R.B.	0.00
615	L. B. McLeod Const. Co.	5	Sarasota	1.20	-----	-----	0.00	0.00	S.T.R.B.	0.00
624	Manly Const. Co.	50	Hamilton	6.48	-----	-----	6.23	0.00	S.T.R.B.	75.60
661	Manly Const. Co.	2	Lake	.14	-----	-----	0.00	0.00	Sheet Asph.	0.00
669-Y	Kerr & Lawrence	27	Collier	13.55	6.10	2.03	-----	-----	Graded	10.20
672	J. B. McCrary Engr. Corp.	1	Leon	9.92	-----	-----	-----	7.62	Concrete	72.00
673	R. G. Lassiter & Co.	1	Gadsden	14.97	-----	-----	-----	8.69	Concrete	56.23
678	McVay Lindsay & Son	10	Bay	9.00	-----	-----	5.98	0.00	S.T.R.B.	65.00
685	Pararo Contr. Co.	10	Franklin	18.46	-----	-----	17.00	3.48	S.T.R.B.	80.00
687-B	Wm. P. McDonald Const. Co.	2	Lake	14.03	-----	-----	14.03	10.72	S.T.R.B.	95.00
688	State Convict Forces	10	Bay	9.32	9.32	9.32	-----	-----	Graded	100.00
695	Manly Const. Co.	2	Lake	.40	-----	-----	.40	0.00	S.T.R.B.	80.00
706-A	Manly Const. Co.	28	Clay	1.14	-----	-----	0.00	0.00	S.T.R.B.	0.00
707	Leon County Forces	43	Leon	5.31	4.88	2.87	-----	-----	Graded	51.00
715	L. M. Gray	28	Union	5.26	-----	-----	0.00	0.00	S.T.R.B.	0.00
716	Duval Engr. & Contr. Co.	28	Bradford	11.22	-----	-----	0.00	0.00	S.T.R.B.	0.00
717	Manly Const. Co.	28	Bradford	10.93	-----	-----	0.00	0.00	S.T.R.B.	0.00
718	Duval Engr. & Contr. Co.	5-A	Columbia	8.22	-----	-----	0.00	0.00	S.T.R.B.	0.00
719	Broadbent Const. Co.	5-A	Suwannee	8.57	-----	-----	8.57	6.85	S.T.R.B.	89.00
722	R. J. Carroll	48	Jefferson	8.83	8.83	8.56	-----	-----	Graded	95.00
723	State Convict Forces	66	Leon	11.76	-----	-----	-----	11.76	Sand Clay	100.00
724	Leon County	66	Leon	10.67	10.67	9.99	-----	-----	Sand Clay	93.00
726	State Convict Forces	19	Dixie	12.62	12.62	12.62	-----	-----	Graded	100.00
728	State Convict Forces	10	Leon	11.65	11.65	11.18	-----	-----	Graded	97.00
732	Gilbert & Hadsock	17	Polk	8.94	8.94	7.60	-----	-----	Graded	85.00
733	W. J. Bryson Paving Co.	33	Walton	4.23	4.23	3.17	-----	0.00	Sand Clay	59.00
734	Penton-Mathis Const. Co.	40	Walton	7.89	7.85	5.21	-----	0.00	Sand Clay	55.29
735	W. J. Bryson Paving Co.	40	Walton	13.71	13.71	7.81	-----	0.00	Sand Clay	55.00
740	Baker & Lewis	10	Gulf	9.63	-----	-----	9.63	9.63	S.T.R.B.	100.00
743	Baker & Lewis	10	Bay	18.25	-----	-----	9.12	6.75	S.T.R.B.	47.15
745	State Convict Forces	19	Taylor	15.95	15.95	15.95	-----	-----	Graded	100.00
749	State Convict Forces	14	Gilchrist	7.81	7.42	7.42	-----	-----	Graded	94.25
749	L. B. McLeod Const. Co.	14	Gilchrist	7.81	-----	-----	0.00	0.00	S.T.R.B.	0.00
750	State Convict Forces	14	Gilchrist	12.97	7.65	7.13	-----	-----	Graded	57.00
750	L. B. McLeod Const. Co.	14	Gilchrist	.71	-----	-----	0.00	0.00	S.T.R.B.	0.00
751	W. J. Bryson Paving Co.	40	Walton	7.28	6.93	3.93	-----	0.00	Sand Clay	39.53
752	W. J. Bryson Paving Co.	40	Walton	8.72	8.35	4.48	-----	0.00	Sand Clay	40.74
755	B. Booth	17	Polk	11.22	11.22	9.54	-----	-----	Graded	85.00
763	Duval Engr. & Contr. Co.	50	Suwannee	12.23	-----	-----	6.17	.62	S.T.R.B.	49.00
764	Duval Engr. & Contr. Co.	50	Suwannee	12.00	-----	-----	12.00	8.00	S.T.R.B.	95.00
765	Duval Engr. & Contr. Co.	50	Suwannee	7.00	-----	-----	6.99	1.40	S.T.R.B.	75.00
766	State Convict Forces	10	Bay	5.74	3.88	1.17	-----	-----	Graded	15.00
767	State Convict Forces	10	Bay	5.27	5.27	5.27	-----	-----	Graded	95.00
780	F. W. Long & Co.	29	Okeechobee	11.00	-----	-----	8.63	0.00	S.T.R.B.	60.00
781	F. W. Long & Co.	29	Okeechobee	11.00	-----	-----	0.00	0.00	S.T.R.B.	0.00
787	State Convict Forces	10	Walton	16.27	5.69	2.44	-----	-----	Graded	11.30
788	W. J. Bryson Paving Co.	10	Walton	17.54	4.20	3.10	-----	-----	Graded	12.10
798	State Convict Forces	13	Nassau	15.03	6.50	3.21	-----	-----	Graded	28.00
802-A	C. C. Hayes	10	Okaloosa	8.68	7.90	4.77	-----	-----	Graded	48.00
802-C	Curry & Turner	10	Okaloosa	10.24	9.22	6.45	-----	-----	Graded	60.00
803	Collins Const. Co.	10	Okaloosa	11.13	8.35	4.12	-----	-----	Graded	46.20
804	C. A. Steed & Sons, Inc.	67	Glades	18.56	18.56	18.56	18.56	18.56	S.T.R.B.	100.00
806-A	R. C. Huffman Const. Co.	25	Hendry	11.00	0.00	0.00	-----	-----	Graded	0.00
806-C	R. R. Stuart	25	Hendry	11.00	0.00	0.00	-----	-----	Graded	0.00
806-D	R. C. Huffman Const. Co.	25	Hendry	12.76	0.00	0.00	-----	-----	Graded	0.00
807-A	R. C. Huffman Const. Co.	25	Palm Beach	10.82	10.82	10.82	10.49	2.71	S.T.R.B.	85.00
807-C	R. C. Huffman Const. Co.	25	Palm Beach	6.13	6.13	5.52	4.29	0.00	S.T.R.B.	83.00
815	G. W. Byrd	54	Okaloosa	13.58	-----	-----	-----	0.00	Sand Clay	0.00
820	H. D. Spangler & Co.	96	Jefferson	9.38	0.00	0.00	-----	-----	Graded	0.00
821	H. D. Spangler & Co.	96	Jefferson	5.13	0.00	0.00	-----	-----	Graded	0.00
840	State Convict Forces	115	Walton	10.45	3.57	2.04	-----	-----	Graded	20.00
842	W. J. Bryson Paving Co.	115	Walton	10.00	4.06	.51	-----	-----	Graded	9.00
844-A	State Convict Forces	115	Okaloosa	7.10	7.04	4.05	-----	-----	Graded	55.00
844-C	State Convict Forces	115	Escambia	5.63	5.63	3.35	-----	-----	Graded	50.00
845	State Convict Forces	19	Taylor	8.57	4.00	3.00	-----	-----	Graded	30.00
854	G. W. Byrd	60	Walton	9.81	1.71	.48	-----	0.00	Sand Clay	3.00
855	C. C. Moore Const. Co.	60	Walton	9.32	2.89	.93	-----	0.00	Sand Clay	12.26
Total complete April 30th, 1929					2823.13	2757.12	1400.35	2021.04		
Complete month of April					22.63	20.10	17.16	37.25		
Total complete March 31st, 1929					2800.50	2737.02	1383.19	1983.79		

TOTAL MILEAGE COMPLETE

	Concrete	Brick	B. C.	S. A.	B. M.	Asph. Block	S.T.R.B.	S.T.S.C.	S.C.	Marl	Total
Complete to March 31, 1929	285.69	17.13	39.75	114.61	109.57	23.20	1103.17	226.39	146.98	27.58	2094.07
Complete month of April	8.81	-----	-----	-----	-----	-----	19.13	-----	5.08	-----	33.02
Complete April 30, 1929	249.50	17.13	39.75	114.61	109.57	23.20	1122.30	226.39	152.06	27.58	2127.09

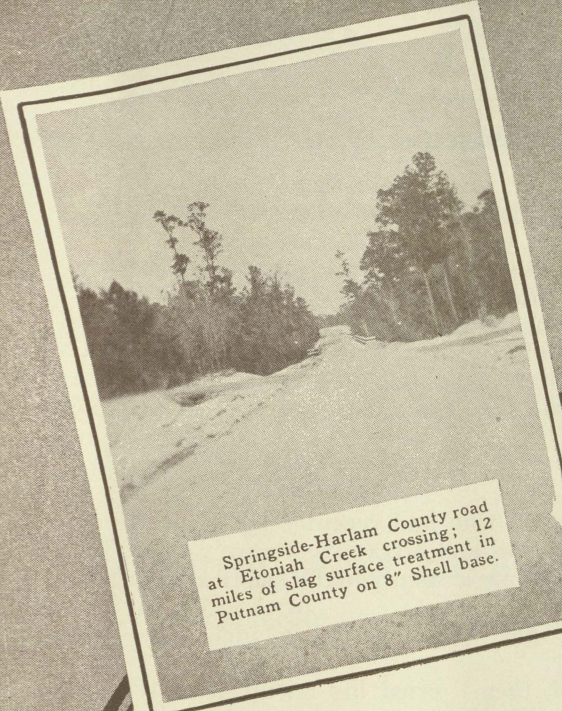
Status of Construction

THROUGH MAY 31ST, 1929

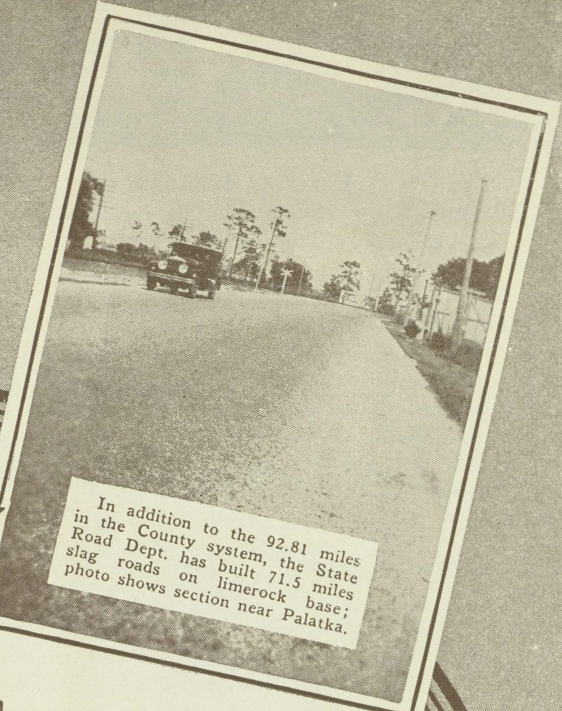
Proj. No.	Contractor	Road No.	County	Total Length Miles	Clearing Miles	Grading Miles	Base Miles	Surface Miles	Type	Per cent Complete
6-A	Duval Engr. & Contr. Co.	1	Madison	5.56	.....	.....	5.56	1.11	S.T.R.B.	76.14
52	R. G. Lassiter & Co.	1	Escambia	10.00	.....	.....	.....	3.50	Concrete	32.00
55	L. M. Gray	14	Alachua	16.44	.....	.....	16.44	14.35	S.T.R.B.	93.00
56	Nelson Brothers	10	Leon	17.98	.....	.....	.....	17.98	Concrete	98.50
518	Broadbent Const. Co.	5-A	Lafayette	17.57	.....	.....	.71	0.00	S.T.R.B.	2.00
587	Duval Engr. & Contr. Co.	5-A	Columbia	4.43	.....	.....	0.00	0.00	S.T.R.B.	0.00
615	L. B. McLeod Const. Co.	5	Sarasota	1.20	.....	.....	0.00	0.00	S.T.R.B.	0.00
624	Manly Const. Co.	50	Hamilton	6.23	.....	.....	6.23	1.25	S.T.R.B.	79.56
661	Manly Const. Co.	2	Lake	.14	.....	.....	.14	0.00	Sheet Asp.	39.00
669-Y	Kerr & Lawrence	27	Collier	13.55	13.14	5.42	.....	.....	Graded	45.00
672	J. B. McCrary Engr. Corp.	1	Leon	9.92	.....	.....	.....	8.62	Concrete	85.00
673	R. G. Lassiter & Co.	.....	Gadsden	14.97	.....	.....	.....	11.09	Concrete	70.00
678	McVay Lindsay & Son	19	Bay	9.70	.....	.....	8.73	1.45	S.T.R.B.	75.00
685	Pararo Const. Co.	10	Franklin	18.46	.....	.....	18.46	7.48	S.T.R.B.	85.00
687-B	Wm. P. McDonald Const. Co.	2	Lake	14.03	.....	.....	14.03	14.03	S.T.R.B.	100.00
695	Manly Const. Co.	2	Lake	.40	.....	.....	.40	.20	S.T.R.B.	90.00
706-A	Manly Const. Co.	28	Clay	1.14	.....	.....	0.00	0.00	S.T.R.B.	0.00
707	Leon County Forces	43	Leon	5.31	4.88	3.50	.....	.....	Graded	59.00
715	L. M. Gray	28	Union	5.26	.....	.....	0.00	0.00	S.T.R.B.	0.00
716	Duval Engr. & Contr. Co.	28	Bradford	11.22	.....	.....	1.68	0.00	S.T.R.B.	11.70
717	Manly Const. Co.	28	Bradford	10.93	.....	.....	0.00	0.00	S.T.R.B.	0.00
718	Duval Engr. & Contr. Co.	5-A	Columbia	8.22	.....	.....	0.00	0.00	S.T.R.B.	0.00
719	Broadbent Const. Co.	5-A	Suwannee	8.57	.....	.....	8.57	8.57	S.T.R.B.	100.00
722	R. J. Carroll	48	Jefferson	8.83	.....	.....	8.56	.....	Graded	97.00
724	Leon County	66	Leon	10.67	10.67	9.99	.....	0.00	Sand Clay	93.00
728	State Convict Forces	10	Leon	11.65	11.65	11.18	.....	.....	Graded	97.00
732	Gilbert & Hadsock	17	Polk	8.94	.....	7.60	.....	.....	Graded	85.00
733	W. J. Bryson Paving Co.	33	Walton	4.23	4.23	3.81	.....	0.00	Sand Clay	62.50
734	Penton-Mathis Const. Co.	40	Walton	7.90	7.85	5.56	.....	0.00	Sand Clay	63.79
735	W. J. Bryson Paving Co.	40	Walton	13.72	13.72	11.25	.....	0.00	Sand Clay	65.11
743	Baker & Lewis	10	Bay	18.25	.....	.....	10.04	6.75	S.T.R.B.	50.00
749	State Convict Forces	14	Gilchrist	7.81	7.81	7.65	.....	.....	Graded	98.00
749	L. B. McLeod Const. Co.	14	Gilchrist	7.81	.....	.....	0.00	0.00	S.T.R.B.	0.00
750	State Convict Forces	14	Gilchrist	12.97	8.43	7.91	.....	.....	Graded	60.40
750	L. B. McLeod Const. Co.	14	Gilchrist	.71	.....	.....	0.00	0.00	S.T.R.B.	0.00
751	W. J. Bryson Paving Co.	40	Walton	7.28	6.93	5.17	.....	0.00	Sand Clay	51.63
752	W. J. Bryson Paving Co.	40	Walton	8.72	8.35	5.14	.....	0.00	Sand Clay	44.00
755	B. Booth	17	Polk	11.22	11.22	9.54	.....	.....	Graded	85.00
763	Duval Engr. & Contr. Co.	50	Suwannee	12.23	.....	.....	12.23	1.85	S.T.R.B.	72.00
764	Duval Engr. & Contr. Co.	50	Suwannee	12.00	.....	.....	.....	12.00	S.T.R.B.	95.00
765	Duval Engr. & Contr. Co.	50	Suwannee	6.99	.....	.....	6.99	6.99	S.T.R.B.	95.50
766	State Convict Forces	10	Bay	8.74	6.55	3.49	.....	.....	Graded	35.00
767	State Convict Forces	10	Bay	5.27	5.27	5.27	.....	.....	Graded	95.00
780	F. W. Long & Co.	29	Okeechobee	11.00	.....	.....	9.63	3.00	S.T.R.B.	75.00
781	F. W. Long & Co.	29	Okeechobee	11.00	.....	.....	0.00	0.00	S.T.R.B.	0.00
787	State Convict Forces	10	Walton	16.27	5.69	3.09	.....	.....	Graded	13.64
788	W. J. Bryson Paving Co.	10	Walton	17.54	5.79	3.86	.....	.....	Graded	15.80
798	State Convict Forces	13	Nassau	15.03	6.50	3.82	.....	.....	Graded	30.10
802-A	C. C. Hayes	10	Okaloosa	8.68	7.90	5.64	.....	.....	Graded	63.00
802-C	Curry & Turner	10	Okaloosa	10.24	9.93	7.17	.....	.....	Graded	62.50
803	Collins Const. Co.	10	Okaloosa	11.13	8.35	4.45	.....	.....	Graded	52.00
806-A	R. C. Huffman Const. Co.	25	Hendry	11.00	1.75	.40	.....	.....	Graded	5.00
806-C	R. R. Stuart	25	Hendry	11.00	1.00	.40	.....	.....	Graded	5.00
806-D	R. C. Huffman Const. Co.	25	Hendry	12.76	1.00	.25	.....	.....	Graded	3.00
807-A	R. C. Huffman Const. Co.	25	Palm Beach	10.82	10.82	10.82	10.60	8.11	S.T.R.B.	92.00
807-C	R. C. Huffman Const. Co.	25	Palm Beach	6.13	6.13	5.82	5.82	.43	S.T.R.B.	88.00
815	G. W. Byrd	54	Okaloosa	13.58	.....	.....	.....	0.00	Sand Clay	0.00
820	H. D. Spangler & Co.	96	Jefferson	9.38	0.00	0.00	.....	.....	Graded	0.00
821	H. D. Spangler & Co.	96	Jefferson	5.13	0.00	0.00	.....	.....	Graded	0.00
840	State Convict Forces	115	Walton	10.45	4.08	3.57	.....	.....	Graded	32.00
842	W. J. Bryson Paving Co.	115	Walton	10.15	4.56	1.31	.....	.....	Graded	16.50
844-A	State Convict Forces	115	Okaloosa	7.10	7.09	4.55	.....	.....	Graded	60.00
844-C	State Convict Forces	115	Escambia	5.63	5.63	4.35	.....	.....	Graded	58.00
845	State Convict Forces	19	Taylor	8.57	4.50	3.50	.....	.....	Graded	33.00
854	G. W. Byrd	60	Walton	9.81	2.86	1.52	.....	.....	Sand Clay	9.15
855	C. C. Moore Const. Co.	60	Walton	9.32	4.20	1.40	.....	.....	Sand Clay	19.06
Total complete May 31st, 1929				2844.29	2781.92	1416.85	2069.63			
Complete month of May				21.16	24.80	16.50	48.59			
Total complete April 30, 1929				2823.13	2757.12	1400.35	2021.04			

TOTAL MILEAGE COMPLETE

	Concrete	Brick	B. C.	S. A.	B. M.	Asph. Block	S.T.R.B.	S.T.S.C.	S.C.	Marl	Total
Complete to April 30, 1929	294.50	17.13	39.75	114.61	109.57	23.20	1122.30	226.39	152.06	27.58	2127.09
Complete month of May	5.74	.....	.....	.05	.....	.....	15.05	.....	4.67	.....	25.51
Complete May 31st, 1929	300.24	17.13	39.75	114.66	109.57	23.20	1137.35	226.39	156.73	27.58	2152.60



Springside-Harlam County road at Etoniah Creek crossing: 12 miles of slag surface treatment in Putnam County on 8" Shell base.

In addition to the 92.81 miles in the County system, the State Road Dept. has built 71.5 miles slag roads on limerock base; photo shows section near Palatka.

SLAG Surfaced Roads in Putnam County (Fla.) cost only \$9,699 per mile

Here is a record that is remarkable even for Florida where LOW COST improved roads have become as much a matter of fact as sunshine and oranges.

Putnam County, and these figures are furnished by S. D. Snider, county engineer, has built since January, 1927, exactly 92.5 miles of "Non-Skid" Slag Surface Treated roads at an average cost of \$9,699 per mile.

The local clay-gravel base (18.10 miles) and the shell base (5.19 miles) were treated with a 4/10 gal. tar prime and 4/10 gal. seal coat covered with 40 lbs. of No. 46 (3-4" to 10 mesh) slag per sq. yd. The seal and cover for the

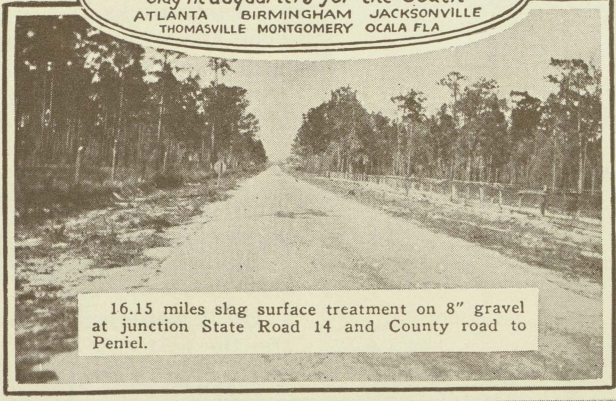
57.22 miles of limerock base was exactly the same as above. However, only half as much (2/10 gal.) prime was used.

Putnam County's first bituminous slag road has been carrying high speed traffic on Dixie Highway since 1922.

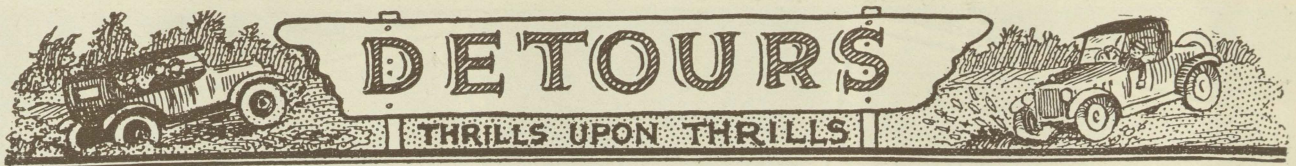
Crushed slag is recognized by the experienced road builder in Florida as the ideal Cover Material for low cost "NON-SKID" pavements. It is blue-gray in color—NON-GLARING, DUSTLESS and STAYS-PUT because of its TOUGHNESS and ANGULARITY which provides greater surface area for adhesion of the bituminous binder. The service record behind more than 2,000 miles of this one type of paving laid during the past ten years establishes these facts conclusively.

BIRMINGHAM SLAG CO.

Slag Headquarters for the South
ATLANTA BIRMINGHAM JACKSONVILLE
THOMASVILLE MONTGOMERY OCALA FLA



16.15 miles slag surface treatment on 8" gravel at junction State Road 14 and County road to Peniel.



Familiar Features

Woman (after shooting man)—“Haven’t I shot you somewhere before?”—Life.

1929 Model

Rastus had taken Mandy to the circus menagerie and was having a great time explaining all about the animals to his girl.

“Lawzee, Rastus, whut’s ‘at?” asked Mandy, when they came to the zebra.

“Don’t you know, gal? You sho’ has neglected yo’ animology. Dat’s nuthin’ but a spo’t model jackass.”

Simile—As scarce as a Scotch bigamist.—Judge.

Mrs. Timkins was taking her son to school for the first time and, after impressing the schoolmaster with the necessity of his having a thorough education, finished up by saying: “And be sure he learns Latin.”

“But, my dear madam,” said the master, “Latin is a dead language.”

“All right,” said Mrs. Timkins, “he’ll want it. He’s going to be an undertaker.”

Old, But Good

During the World War, one of the great steamships that was used as a transport for soldiers was on her way across when a torpedo boat was sighted. In anticipation of the danger they were in, all on board were lined up on deck.

There was a deathly hush for an instant, when suddenly from down the line a negro’s voice rang out: “Is dar ennybody heah dat wants to buy a gold watch and chain?”

Alibis For All

It was visiting day at the insane asylum. One of the inmates imagined himself to be an artist, and he was busily engaged in dabbing at an empty canvas with a dry brush. A visitor, wishing to humor him, asked what the picture represented.

“That,” said the nut, “is a picture of the Israelites being pursued through the Red Sea.”

“Where is the sea?”

“Why, that’s rolled back to allow the Israelites to pass.”

“Where are the Israelites?”

“They’ve just gone by.”

“Then where are their pursuers?”

“Oh, they’ll be along in a minute.”—Pup.

Jilted Go-Getter

She: “Here is your ring—I find we are not suited to each other.”

He: “Tell me the truth—you love another?”

“Yes.”

“Tell me his name—I insist.”

“You want to harm him?”

“No, I want to sell him this ring.”—Hummel (Hamburg).

Late Models

A balky mule has four-wheel brakes,

A billy goat has bumpers,

The firefly is a bright spotlight.

Rabbits are puddle jumpers.

Camels have balloon-tired feet

And carry spares of what they eat,

But still I think that nothing beats

The kangaroos with rumble seats.

—The Earth Mover.

\$\$\$\$\$\$\$

For a lad who had recently got himself engaged to a beautiful and attractive young woman, his face was radiating a surprisingly small amount of rap-ture.

“I’ve got a million-dollar girl,” he confided gloomily.

“Well, then,” cried his friend heartily, “you’re fixed for life.”

“No, no, you misunderstand. That’s the upkeep.” —American Legion Monthly.

For Your Music Album

Have you heard—

—the cheese song? (“Ain’t cheese sweet?”)

—the goldiggers’ national anthem? (I’ll Go Buy As Long As I Have You!”)

—the negro Marseillaise? (“Massa lays in de cold, cold ground.”)

—that new sonata? (“Just sonata day wasted away!”)

—the Scotch hymn? (“I’m glad salvation’s free!”)

—the Elsie song? (“Elsie you in my dreams!”)

—The Pathfinder.

The Young Idea on the Job

Some original and amusing answers to questions were found in the note-book work of the Week Day Bible School pupils who attend St. Paul’s school. The following are some of them:

“Was it wrong for the disciples to pluck and eat the grain on the Sabbath day?” Reply, “Heck, no.”

“How did the Pharisees feel about this? Answer, “Peeved.”

“Name two whom Jesus healed on the Sabbath.” Answer, “A guy with a withered hand and a lady with rummaticks.”

The above three replies were made by one boy in one lesson’s work.

At least two maintained that Jesus ate with Republicans and Sinners.—St. Paul’s Observer.

Caledonian Comedy No. 999999

Well, it seems there were a couple of Scotchmen, and the first said:

“Lips that touch liquor shall never touch mine.”

So the second said:

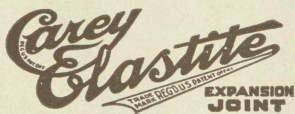
“Oh, I wouldn’t be so particular about my lips.”

So the first said:

“I wasna saying anything about by lips—I mean my liquor.”—The American Legion Monthly.

CAREY Elastite Expansion Joint never melts in hot weather, nor can it become brittle at zero. As easily handled as a board—saves time—any laborer can install it.

THE PHILIP CAREY COMPANY
Lockland, Cincinnati, Ohio



WOOD PRESERVERS SINCE 1878

THOROUGHNESS—AND WOOD PRESERVATION

Thoroughness of every step probably accounts for the superiority of Eppinger & Russell Co. treated wood products.

Extreme care in the selection of sound timber, proper seasoning, painstaking supervision in their treatment, and deep penetration with dependable preservatives, make for a product that is bound to give a large margin of safety and long service. Fifty years' experience—our engineering department and two modern plants are at your disposal.

Creosote or ZMA Treated

10 Murray St., Suite 1812, New York City
PLANTS—Jacksonville, Fla.
and
Long Island City, N. Y.

ZMA

CREOSOTE

EPPINGER & RUSSELL Co.
WOOD PRESERVERS SINCE 1878

Instrument Repairing by Experts

Q Surveying Instruments and other Technical Goods used by Engineers and Contractors, repaired and overhauled in the most completely equipped shop in the South.

Q Modern machinery, expert workmen and latest methods insure satisfactory results, reasonable prices and unusually quick delivery of all work entrusted to us.

*Technical Goods for the
Engineer and Contractor*

Drew Co.
THE H. & W. B.
EST. 1855 - QUALITY EVER SINCE

45-49 West Bay St. Jacksonville

**FOR
WOODSTOCK
SLAG**

Quality

Aggregate

**For any Type Concrete Paving or
Surface Treatment**

Woodstock Slag Corporation

Southern Railway Bldg.
BIRMINGHAM, ALABAMA

PLANTS

Woodward, Ala.

E. B'ham, Ala.

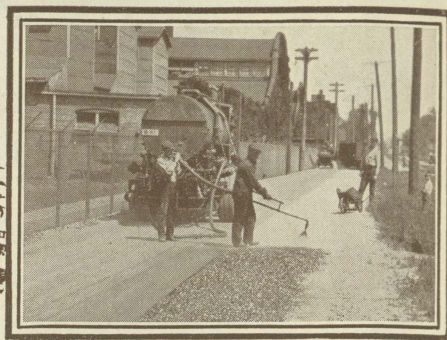
Florida Office:

525 Professional Bldg., 305 Morgan St., Tampa Fla.

WRITE

WIRE

TELEPHONE



Widening a narrow cement-concrete road with Tarmac T penetration pavement. North Chicago, Illinois.

Tarmac

will salvage worn roads at low cost

THOUSANDS of miles of old roads with good foundations, which otherwise will have to be torn up or abandoned in a few years, can be saved by resurfacing with Tarmac.

Tarmac provides new, hard-surfaced, skid-proof, smooth-riding, high-speed surfaces—at a fraction of the cost of expensive replacement.

Tarmac surface treatments over old pavements penetrate the surface and become an integral part of the road. Tarmac penetration or Cold Mix surfaces allow an entirely new wearing course to be built at minimum expense.

Information and prices will be sent on request—and without obligation.

AMERICAN TAR PRODUCTS COMPANY

General Offices: PITTSBURGH, PA.

New England Division: TAR PRODUCTS CORPORATION, Providence, R. I.

Plants

Chicago, Ill.	Utica, N. Y.	Providence, R. I.	Follansbee, W. Va.
Milwaukee, Wis.	St. Paul, Minn.	New Haven, Conn.	St. Louis, Mo.
Youngstown, O.	Hamilton, O.	Birmingham (Woodward), Ala.	Kearny, N. J.

THERE'S A GRADE OF **Tarmac** FOR EVERY HIGHWAY NEED

Tarmac P...for Cold Surface Treating,
Prime Coating and Mixed-in-Place Construction.

Tarmac T...for Penetration Pavement Construction

Tarmac A...for Hot Surface Treating

Tarmac CP...for Cold Patching

Tarmac HP...for Crack Filling and Hot Patching

Tarmac

MAKES GOOD ROADS

FLORIDA REPRESENTATIVE
M. D. MOODY

402 Masonic Temple, Jacksonville, Fla.